

# Boston Transit Commission.

## Nineteenth Annual Report.



June 30, 1913

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# NINETEENTH ANNUAL REPORT

OF THE

# BOSTON TRANSIT COMMISSION,

FOR THE YEAR ENDING

JUNE 30, 1913.



BOSTON

E. W. DOYLE, PRINTER

185 Franklin Street

1913



# BOSTON TRANSIT COMMISSION.

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15 BEACON STREET, BOSTON, June 30, 1913.

TO THE CITY COUNCIL OF THE CITY OF BOSTON:—

In compliance with Statutes of 1894, chapter 548, section 24, the report of the Boston Transit Commission for the year ending June 30, 1913, is respectfully submitted.

## BOYLSTON STREET SUBWAY.

The record of detailed progress on the Boylston street subway will be found in the report of the Chief Engineer. The work has steadily progressed, and of the portion between the western entrance and Arlington street 75 per cent. is now completed.

The principal engineering problem in connection with this subway was the construction opposite the tower of the Old South Church at Boylston and Dartmouth streets. It is a well-known fact that this tower is not vertical, as it should be, but has leaned from the perpendicular towards the west and southwest ever since its completion. Its deflection at the top is about two feet ten inches from the perpendicular. In order to construct the subway in front of the church, a line of steel sheet piling was driven on each side of the subway in the street, pipes were driven behind this sheeting on both sides, to a depth below the bottom of the subway, and neat cement grout was pumped into the ground under pressure. The subway will be constructed in narrow slices extending clear across between the lines of sheet piling, each slice being completed before the adjoining one is begun. This will diminish as much as possible the amount of trench open in the street at any one time.

### *Possible Change of Route.*

On April 18 the Senate of the Massachusetts General Court adopted an order requesting the Commission to report within three weeks as to the probable cost of extending the Boylston



street subway to Post Office square, providing for an exchange of traffic with the existing subways and tunnels and with the Dorchester tunnel under construction; and as to whether it was the opinion of the Commission that such alteration in the route would be desirable.

The Commission submitted estimates of the cost of a possible route to Post Office square, but stated that the time allowed for the making of the report was too short to enable it to arrive at a definite conclusion upon so important a question. It therefore suggested that the existing law should be amended so that the Boylston street subway might be connected with the Tremont street subway at some suitable point near Park square, allowing the temporary use of that portion of the Boylston street subway between the western end and such connection, and that the question of the change of terminal to Post Office square be left open for further study. The Boston Elevated Railway Company, the lessee corporation, stood ready to assent to such change in the law.

The Commission also suggested that authority be given to abandon the present Public Garden incline of the Tremont street subway and to construct a new incline in Boylston street, this street being widened for the purpose by taking so much land from the Garden as would be necessary to maintain the present width of travelled way, filling up the present incline and restoring it to the Garden.

As a result of this report the General Court passed an act, chapter 810, authorizing the temporary connection of the Boylston street subway with the Tremont street subway, the transfer of the Public Garden incline to Boylston street, and the widening of Boylston street in the manner suggested by the Commission; and requiring the Commission to report in January next upon the question of the terminal of the Boylston street subway, directing in the meantime the suspension of work upon that subway between the temporary connection and Park street.

The order of the Senate, the report of the Commission to the General Court, and chapter 810, will be found in Appendixes A and B.



*Cars on Boylston Street.*

To facilitate and hasten the construction of the subway in front of the Old South Church and under Boylston street as far as Arlington street, the Commission on March 20, 1913, passed an order for the relocation of the tracks of the Boston Elevated Railway Company, so that cars should be diverted from Boylston street between Exeter and Arlington streets, passing instead through Exeter street, Huntington avenue, St. James street and Arlington street.

Partly if not largely on account of this diversion, the Contractor for this portion of the subway has been able to prosecute his work with extraordinary speed and with safety to the street car traffic. It is hoped that this more rapid construction will make up to the merchants on Boylston street for the temporary diversion of car traffic from the street.

*Westerly Terminal.*

The Commission finally decided that the incline of the westerly terminal on Kenmore street should remain uncovered and the wall of the incline has been completed and surmounted by an ornamental concrete balustrade. The plan for this entrance and for the treatment of the park at this point has been prepared by A. A. Shurtleff. It is believed that this treatment, when completed, with shrubbery and evergreens masking the incline, will be found satisfactory to those interested.

*Massachusetts Avenue Station.*

On September 4, 1912, an easement was taken in the property of the Massachusetts Avenue Associates, commonly known as the Cab Company building, for the Massachusetts avenue station. The building on the premises was old and, in the opinion of the Commission and of its contractors, was unsafe. By order of the Building Commissioner of the City of Boston, it was so repaired as to satisfy his Department, but it still remained in such a condition that the Commission deemed it unwise to conduct building operations beneath it, and accordingly, on April 3, 1913, the entire property was taken and the building immediately razed.

## DORCHESTER TUNNEL.

Work on the Dorchester tunnel has progressed rapidly and steadily, the structure being now under construction as far east as Arch street. A route for the remainder has been selected which will carry the tunnel to the north of the South station and longitudinally under Fort Point Channel into South Boston. The consent of the United States War Department has been obtained for the construction of the portion under Fort Point Channel, and a location plan showing this route has been filed with the Commissioner of Public Works.

*Entrance and Exit and Show Window Privileges.*

Early in the progress of the work on the Dorchester tunnel, applications were made to the Commission from various firms doing business along the line of the tunnel in the vicinity of Washington and Summer streets for privileges for entrances and exits and for show windows. Inasmuch as in certain cases the side walls of the tunnel do not coincide with the side lines of the street, new questions of law arose as to the parties interested and their respective rights and interests. After many conferences with owners and abutters and with the City Law Department, the following principles were formulated regarding the various interests and their standing, and the procedure to be adopted:

*In the Matter of Show Windows and Private Entrances and Exits.*

The parties interested are the City of Boston, the abutting owners and those claiming under them, the Boston Elevated Railway Company and the Boston Transit Commission.

The Boston Transit Commission has no authority to occupy more area under the street than is reasonably requisite for the tunnel purposes as defined in the act, nor has it authority to incur expenditures in adapting any such additional area to uses other than those so defined.

If it is desired for the benefit of the abutters and those claiming under them that show windows and private entrances and exits should be provided in such additional space the following things will be requisite:

1. If any license or permits for easements under the street are requisite they must be secured from the City of Boston.

2. The assent of the parties interested as owners of real estate or otherwise must be obtained.

3. The approval of the Boston Elevated Railway Company, the lessee of the tunnels, must be secured.

4. The approval of the Boston Transit Commission must be secured. The work must be done according to plans prepared by the Commission and in a manner satisfactory to it. All precautions for the safety of the public which the Commission deems proper must be complied with. Said City and said Commission must be fully protected against expense, loss and damage caused by such construction or resulting from the use of the same.

#### DORCHESTER TUNNEL EXTENSION TO THE SOUTH.

Chapter 27 of the Resolves of 1912 required the Commission to report regarding a route for the extension of the Dorchester tunnel to a point south of the terminal authorized by the act under which the tunnel is being constructed, provided the City Government of Boston should provide such sum as the Commission might estimate would be necessary for the expense of such report.

The City Government having appropriated \$3,000 therefor, the Commission gave public hearings and gave its opinion as to the best route for such extension. Out of the appropriation of \$3,000 the sum of \$520.19 was expended. The report will be found in Appendix C.

#### EAST BOSTON TUNNEL EXTENSION.

The work thus far done upon the extension of the East Boston tunnel has been in underpinning the buildings and the present station in Scollay square, a work of considerable difficulty. As definite plans for this work could not be prepared and estimated on economically, the work has been done by Isaac Blair & Co., Inc., under contract at actual cost plus ten per cent.

*Cambridge Street Widening.*

The Act authorizing the East Boston Tunnel extension requires the Commission to widen Cambridge street where the western incline is located, in order to maintain the travelled width of the street. After public hearings, the Commission determined to make the widening entirely upon the north side of the street, between Chambers and North Russell streets.

In making this widening the Commission is required to proceed under the statutes which govern the acts of the Street Commissioners of the City of Boston. Due notice was therefore given of a public hearing, which was held on June 10, and on that day the order of declaring the widening to be a public necessity was passed and the estates on the north side of the street between Chambers and North Russell streets were taken. This order was returned with the approval of the Mayor June 19 and immediately filed with the Registry of Deeds for the County of Suffolk, thereupon becoming effective.

Bids are to be opened July 1, 1913, for the removal of the buildings from the land taken for the widening.

## WASHINGTON STREET TUNNEL.

The principal matter to be mentioned in connection with the Washington Street tunnel during the year has been the settlement for the taking in the Liberty Tree Block, so-called, at the corner of Washington and Essex streets, for entrance and exit purposes. At the time the taking was made the Commission made an award of \$125,000. This was not satisfactory to the owners and they made preparations for a trial of the case, but before the day appointed by the Court for the trial the offer made to the owners by the late Corporation Counsel Babson of \$216,000 was accepted. The award of the Commission, with interest from the date of the taking, May 31, 1905, would have amounted to about \$185,000.

## CAMBRIDGE CONNECTION.

In the last report was included correspondence between the Mayor and the Commission in relation to the alteration and reduction in size of the stairway coverings on Tremont street for the Cambridge Connection. Such alteration would have



been impossible without the consent of the Boston Elevated Railway Company, the lessee corporation, that the expense thereof should be included in the cost of the Cambridge Connection. Such consent the Company at first declined to give, but later assented to an expenditure not exceeding \$5,000. The Commission deemed it wise to let the structures remain as they were during the winter; but in May, 1913, the Commission determined to remodel the structures. Mr. C. Howard Walker, the architect of the original coverings, was asked to make the plans for the alterations. These have been completed and the contract for the changes is ready for execution.

#### MISCELLANEOUS.

The General Court of 1912, by chapter 109 of the resolves for that year, provided for an investigation of the advisability and cost of constructing a tunnel between the cities of Boston and Chelsea whenever the City of Chelsea should have made an appropriation sufficient to cover the cost of such investigation. No such appropriation having been made by the City of Chelsea, no action was taken under the resolve.

During the year increased accommodations have become necessary for the outside operations of the Commission's engineering force in connection with supplies, tests, the construction of concrete poling boards, bending steel rods, etc.; and for that purpose about 16,000 square feet of land at the corner of C and Cypher streets, South Boston, were leased from the Directors of the Port of Boston at an annual rental of \$3,500.

#### LEGISLATION.

The General Court of 1913 passed the following acts and resolves affecting the work of the Commission:

Acts, chap. 775, providing for the construction of additional tunnels and subways in the City of Boston. This Act provides for a two-track tunnel or subway for elevated cars or trains from the present end of the Washington street tunnel to Sullivan square. The Act is conditional upon its acceptance by the voters of the City of Boston at the next city election and upon the consent of the Company by its Board of Directors. (See Appendix D.)

Acts, chap. 777, modifying certain locations of the Boston Elevated Railway Company and providing for the construction

of a subway in the cities of Everett and Malden. The work contemplated in this Act is to be carried out by the Commission if it has not been done within five years after date of its acceptance by the Company. (See Appendix E for so much of the Act as relates to the Commission.)

Acts, chap. 810, relative to the Boylston street subway. This Act provides for a further investigation and report to the next General Court whether the route of the Boylston street subway shall be so altered as to make its terminal at Post Office square. Permission is also given to move the incline of the present subway from the Public Garden to Boylston street and to connect the portion of the Boylston street subway constructed to that point with the present subway in the vicinity of Charles street. (See Appendix B.)

Resolves, chap. 69, providing for investigating the advisability of constructing a station for the Washington street tunnel at or near Bennet street. (See Appendix F.)

Resolves, chap. 78, relative to the construction of a tunnel between the cities of Boston and Chelsea, providing for an investigation by the Commission, expense to be borne equally by the cities of Boston and Chelsea. (See Appendix G.)

Resolves, chap. 84, providing for an investigation relative to the removal of the elevated structure from Washington street and Main street and the extension of the Washington street tunnel to Dudley street and the construction of a subway from City square to Sullivan square. (See Appendix H.)

Resolves, chap. 93, requesting the Commission to investigate and report on the advisability and cost of constructing a subway to connect the Dorchester tunnel with the South Terminal Station. (See Appendix I.)

Resolves, chap. 108, providing for the investigation of the services of street railway companies. This Resolve directs the Commission to sit jointly with the Board of Railroad Commissioners, now the Public Service Commission, to inquire into and consider the street railway service furnished by the Boston Elevated Railway Company and the Bay State Railway Company. The joint commission shall give public hearings and shall have authority to administer oaths and to require the attendance of witnesses and the production of books and papers. (See Appendix J.)

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DEATH OF GEORGE G. CROCKER.

The Honorable George G. Crocker, who has been a member of the Commission and its Chairman from the beginning of its work, died Monday, May 26th, of uremia, at his summer home in Cohasset after a very short illness.

The following entry was made upon the records of the Commission:

The members of the Boston Transit Commission desire to place on record their deep sense of public and personal loss through the death on May 26th of George G. Crocker, Chairman of the Commission.

Mr. Crocker has presided over the deliberations of the Commission and devoted his best energies to its work since its original organization, nineteen years ago. During all this long period of service he has shown unvarying courtesy to all, eminent ability, and rare conscientiousness. Of large experience in affairs, he was wise in counsel, careful and deliberate in judgment, fair-minded in his dealings with every interest, devoted to the welfare of the public. By his death the City of Boston has lost a valuable public servant and the members of the Commission have been deprived of a colleague whose place cannot be filled and of a loyal friend whom they will always hold in affectionate remembrance.

## DEATH OF GEORGE A. KIMBALL.

On the death on December 3rd of George A. Kimball, who had been Chief Engineer of the Boston Elevated Railway Company for many years, the Commission made the following entry upon its records:

In the twelve years during which Mr. George A. Kimball has been Chief Engineer of the Boston Elevated Railway Company, the Boston Transit Commission has had frequent occasion to confer with him on intricate engineering problems involving varied public and private interests which at times have been antagonistic and hard to reconcile. The association of its members with him has steadily strengthened their recognition of his high standing as an engineer of skill and discretion, but they wish no less distinctly to record the fact that he never allowed the great burden of his professional work to break down his innate refined courtesy and good will, and that he ever sustained a modesty of bearing far disproportionate to his deserts.

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## TERM OF THE COMMISSION.

The term of the Commission will expire July 1, 1914. At that date it is hoped and expected that the Boylston street subway will be completed to the temporary con-



nection with the Tremont street subway, as authorized by chapter 810, Acts of 1913. There will remain unfinished, the greater part of the Dorchester tunnel and a large portion of the East Boston tunnel extension, together with the extension of the Boylston street subway to whatever point may finally be determined upon as its permanent easterly terminal. Much of this work is difficult and complicated in character, under narrow streets and under tide-water, and even under favorable circumstances will require several seasons for its completion.

Some provision must be made by the General Court for the continuation and completion of this work.

#### CHAIRMAN OF THE COMMISSION.

On Monday, June 2, George F. Swain, who was a member of the Subway Commission authorized by the General Court of 1893 and a member of the present Commission from its beginning, was unanimously elected chairman to succeed the late George G. Crocker.

#### EAST BOSTON TUNNEL.

##### *Toll Receipts.*

The following is a statement of the receipts from tolls and the cost of collection of the same for the year ending June 30, 1913:

##### July 1, 1912 to July 31, 1912:

Receipts . . . . .	\$12,040 95	
Cost . . . . .	1,658 90	
	<hr/>	\$10,382 05

##### August 1, 1912 to October 31, 1912:

Receipts . . . . .	\$40,316 67	
Cost . . . . .	5,038 51	
	<hr/>	35,278 16

##### November 1, 1912 to January 31, 1913:

Receipts . . . . .	\$43,026 79	
Cost . . . . .	5,880 37	
	<hr/>	37,146 42

##### February 1, 1913 to April 30, 1913:

Receipts . . . . .	\$41,470 68	
Cost . . . . .	6,626 87	
	<hr/>	34,843 81

##### May 1, 1913 to June 30, 1913:

Receipts . . . . .	\$29,150 23	
Cost . . . . .	4,342 41	
	<hr/>	24,807 82

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\$142,458 26

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## SINKING FUND.

The following is the condition of the debt and of the sinking funds for the various divisions of the work of the Commission at the date of this report, as stated by the City Treasurer:

## SUBWAY (INCLUDING ALTERATIONS.)

(Debt, \$4,416,000, outside debt limit.)

Amount of fund, July 1, 1912 . . . . .		\$1,433,457 09
Interest on bank deposits, July 1, 1912, to date, . . . . .	\$318 02	
Interest on investments, July 1, 1912, to date, . . . . .	52,212 50	
Revenue, etc., July 1, 1912, to date . . . . .	35,035 00	
		<hr/>
		87,565 52
		<hr/>
		\$1,521,022 61
		<hr/>

## CHARLESTOWN BRIDGE, No. 1.

(Debt, \$750,000, inside debt limit.)

Amount of fund, July 1, 1912 . . . . .		\$203,086 25
Interest on bank deposits, July 1, 1912, to date, . . . . .	\$186 30	
Interest on investments, July 1, 1912, to date, . . . . .	7,217 36	
Requirement for debt . . . . .	7,821 00	
		<hr/>
		15,224 66
		<hr/>
		\$218,310 91
		<hr/>

## CHARLESTOWN BRIDGE, No. 2.

(Debt, \$805,000, outside debt limit.)

Amount of fund, July 1, 1912 . . . . .		\$235,069 93
Interest on bank deposits, July 1, 1912, to date, . . . . .	\$332 46	
Interest on investments, July 1, 1912, to date, . . . . .	8,130 56	
Revenue, etc., July 1, 1912, to date . . . . .	2,539 94	
Requirement for debt . . . . .	5,864 00	
		<hr/>
		16,866 96
		<hr/>
		\$251,936 89
		<hr/>

## EAST BOSTON TUNNEL.

(Debt, \$3,243,000, outside debt limit.)

Amount of fund, July 1, 1912 . . . . .		\$468,178 17
Interest on bank deposits, July 1, 1912, to date, . . . . .	\$470 74	
Interest on investments, July 1, 1912, to date, . . . . .	16,415 57	
Revenue, etc., July 1, 1912, to date . . . . .	82,071 61	
		<hr/>
		98,957 92
		<hr/>
		\$567,136 09
		<hr/>

## BOSTON TUNNEL AND SUBWAY.

(Washington Street Tunnel.)

(Debt, \$8,478,700, outside debt limit.)

Amount of fund, July 1, 1912 . . . . .		\$577,185 07
Interest on bank deposits, July 1, 1912, to date, . . . . .	\$588 31	
Interest on investments, July 1, 1912, to date, . . . . .	21,401 37	
Revenue, etc., July 1, 1912, to date . . . . .	109,570 86	
		<hr/>
		131,560 54
		<hr/>
		\$708,745 61
		<hr/>

## RAPID TRANSIT—CAMBRIDGE CONNECTION.

*(Debt, \$1,450,000, outside debt limit.)*

Amount of fund, July 1, 1912 . . . . .		\$23,242 02
Interest on bank deposits, July 1, 1912, to date, . . . . .	\$12 00	
Interest on investments, July 1, 1912, to date, . . . . .	914 37	
Revenue, etc., July 1, 1912 to date . . . . .	18,692 67	
		<u>19,619 04</u>
		<u>\$42,861 06</u>

## BOYLSTON STREET SUBWAY.

*(Formerly Riverbank Subway.)**(Debt, \$3,005,000, outside debt limit.)*

Amount of fund, July 1, 1912 . . . . .		\$1,409 18
Interest on bank deposits, July 1, 1912, to date, . . . . .	\$12 49	
Interest on investments, July 1, 1912, to date, . . . . .	30 62	
		<u>43 11</u>
		<u>\$1,452 29</u>

## DORCHESTER TUNNEL.

*(Debt, \$1,750,000, outside debt limit.)*

## EAST BOSTON TUNNEL EXTENSION. .

*(Debt, \$1,050,000 outside debt limit.)*

## RENTALS PAID BY THE BOSTON ELEVATED RAILWAY COMPANY.

The following is a statement of the bills rendered for rental of the various tunnels and subways and the amounts paid thereon:

*Tremont Street Subway.*

Sept. 30, 1912:		
Net cost of subway . . . . .	\$4,100,955 72	
One quarter's rental . . . . .		\$49,980 40
Alterations: net cost . . . . .	242,673 93	
One quarter's rental . . . . .		2,957 59
Dec. 31, 1912:		
Net cost of subway . . . . .	4,100,955 72	
One quarter's rental . . . . .		49,980 40
Alterations: net cost . . . . .	242,673 93	
One quarter's rental . . . . .		2,957 59
March 31, 1913:		
Net cost of subway . . . . .	4,100,955 72	
One quarter's rental . . . . .		49,980 40
Alterations: net cost . . . . .	242,673 93	
One quarter's rental . . . . .		2,957 59
June 30, 1913:		
Net cost of subway . . . . .	4,100,955 72	
One quarter's rental . . . . .		49,980 40
Alterations: net cost . . . . .	242,673 93	
One quarter's rental . . . . .		2,957 59
		<u>\$211,751 96</u>

*Washington Street Tunnel.*

	BILLS RENDERED.	PAID.
Sept. 30, 1912:		
Net Cost of tunnel . . .	\$7,627,569 70	*\$85,277 29
Rental for one quarter . . .	\$85,810 16	85,810 16
Dec. 31, 1912:		
Net cost of tunnel . . .	7,627,614 70	
Rental for one quarter . . .	85,810 67	85,810 67
March 31, 1913:		
Net cost of tunnel . . .	7,651,168 34	
Rental for one quarter . . .	86,075 64	86,075 64
June 30, 1913:		
Net cost of tunnel . . .	7,870,656 48	
Rental for one quarter . . .	88,544 89	†
Year ending January 31, 1910		** { 14,452 17
Year ending January 31, 1911		13,033 24
Year ending January 31, 1912		7,129 49
Interest		4,283 88
Total . . .	\$346,241 36	\$381,872 54

*Cambridge Connection.*

September 30, 1912:		
Net cost of connection . . . . .	\$1,387,403 23	
One quarter's rental . . . . .		\$16,908 98
December 31, 1912:		
Net cost of connection . . . . .	1,400,413 78	
One quarter's rental . . . . .		17,067 54
March 31, 1913:		
Net cost of connection . . . . .	1,406,791 68	
One quarter's rental . . . . .		17,145 27
June 30, 1913:		
Net cost of connection . . . . .	1,418,423 50	
One quarter's rental . . . . .		17,287 04
Total . . . . .		\$68,408 83

\* Paid on account of quarter ending June 30, 1912.

† Payment for this quarter had not been made at the date of this report (\$88,544.89).

\*\* The first three items were withheld by the Boston Elevated Railway Company pending a decision of a legal point as to the reckoning of interest. This point was decided in favor of the Commission and these sums were paid during the year covered by this report. The last item is interest on these amounts.

## STATEMENT OF EXPENSES.

The following is a classified statement of the expenses of the Commission for the year ending June 30, 1913:

EAST BOSTON TUNNEL.			
ENGINEERING DEPARTMENT.			
Labor . . . . .	\$57 00		
Office supplies . . . . .	7 83		
Skilled service . . . . .	497 80		
			\$562 63
SECTION B.			
Construction . . . . .	\$379 02		
Field supplies . . . . .	783 02		
Instruments . . . . .	5 25		
Labor . . . . .	8,572 54		
Legal and expert advice . . . . .	25 00		
Office supplies . . . . .	137 44		
Skilled service . . . . .	1,155 70		
Teaming . . . . .	68 65		
			11,126 62
SECTION C.			
Construction . . . . .	\$249 12		
Field supplies . . . . .	20,385 09		
Labor . . . . .	2,067 23		
Legal and expert advice . . . . .	200 00		
Office supplies . . . . .	80		
Skilled service . . . . .	114 20		
Teaming . . . . .	8 50		
			23,024 94
SECTION D.			
Field supplies . . . . .	\$1,600 00		1,600 00
SECTION E.			
Skilled service . . . . .	\$2 13		2 13
SECTION F.			
Field supplies . . . . .	1,806 11		
Teaming . . . . .	75		
			1,806 86
BOSTON TUNNEL AND SUBWAY.			
General Expenses:			
Office—Printing . . . . .	\$45 00		45 00
ENGINEERING DEPARTMENT.			
Skilled service . . . . .	\$242 75		
Credit: Stock—received from Boston Elevated Railway Company on account telephone booths . . . . .	110 95		
			131 80
SECTION ONE.			
Legal and expert advice . . . . .	\$150 00		
Property Damages: Takings . . . . .	3,219 35		
			3,369 35
Carried forward . . . . .			\$41,669 33

*Brought forward* . . . . . \$41,669 33

## SECTION TWO.

Credit: Boylston street station—received from Boston Elevated Railway Company on ac- count telephone booths . . . . .	\$661 57	
LaGrange street station—received from Boston Elevated Railway Company on account telephone booths . . . . .	575 49	
	<hr/>	1,237 06
Balance .. . . .		<hr/> \$40,432 27

## SECTION THREE.

Damages . . . . .	\$3,109 00	
Essex street entrance . . . . .	2,564 02	
Legal and expert advice . . . . .	177 60	
Property Damages: Takings . . . . .	216,000 00	
	<hr/>	\$221,850 62
Credit: Hayward place station—received from Boston Elevated Railway Company on ac- count telephone booths . . . . .	566 13	
	<hr/>	221,284 49
		<hr/> \$261,716 76

## SECTION FOUR.

Credit: Summer street station—received from Boston Elevated Railway Company on ac- count telephone booths . . . . .	\$770 34	
Temple place station—received from Boston Elevated Railway Company on account telephone booths . . . . .	633 69	
Winter street station—received from Boston Elevated Railway Company on account telephone booths . . . . .	659 72	
	<hr/>	2,063 75
Balance . . . . .		<hr/> \$259,653 01

## SECTION FIVE.

Property Damages—Takings . . . . .	\$33,327 30	
Credit: Franklin street station—re- ceived from Boston Elevated Rail- way Company on account telephone booths . . . . .	\$622 39	
Old South station—received from Boston Elevated Railway Com- pany on account telephone booths	1,240 39	
Water street station—received from Boston Elevated Railway Com- pany on account telephone booths . . . . .	7 42	
	<hr/>	1,870 20
	<hr/>	31,457 10
<i>Carried forward</i> . . . . .		<hr/> \$291,110 11



*Brought forward* . . . . . \$291,110 11

## SECTION SIX.

Credit: Construction—received from Boston Elevated Railway Company on account tele- phone booths . . . . .	\$638 56	638 56
Balance . . . . .		\$290,471 55

## SECTION EIGHT.

Credit: Adams square station— Deduction made to cover repairs . . . . .	1 44	1 44
Balance . . . . .		\$290,470 11

## SECTION NINE.

Legal and expert advice . . . . .	\$100 00	
Property Damages: Takings . . . . .	20,090 08	
	\$20,190 08	
Credit: Union station—Received from Boston Elevated Railway Company on account telephone booths . . . . .	1,570 57	18,619 51

## CAMBRIDGE CONNECTION.

## ENGINEERING DEPARTMENT.

Instruments . . . . .	\$1 00	
Labor . . . . .	30 00	
Printing . . . . .	165 84	
Skilled service . . . . .	177 83	
		374 67

## SECTION ONE.

Damages . . . . .	\$1,225 46	
Legal and expert advice . . . . .	1,485 34	
Property Damages: Takings . . . . .	30,512 97	
		33,223 77

## SECTION TWO.

Coleman Brothers (Contract 393) . . . . .	\$8,243 00	
Builders Iron and Steel Company (Contract 408) . . . . .	535 80	
Otis Elevator Company (Contract 404) . . . . .	6,875 00	
Otis Elevator Company (Contract 405) . . . . .	6,591 02	
Coleman Brothers (Contract 407) . . . . .	269 20	
Construction . . . . .	467 50	
Field supplies . . . . .	22 72	
Labor . . . . .	781 74	
Lighting . . . . .	6 84	
Skilled service . . . . .	17 95	
Stationery-supplies . . . . .	16 69	
Teaming . . . . .	28 21	
Tools . . . . .	11 20	
	\$23,866 87	
Credit: Paving—net sale of blocks . . . . .	234 69	23,632 18
<i>Carried forward</i> . . . . .		\$366,320 24



*Brought forward* . . . . . \$366,320 24

## DORCHESTER TUNNEL.

## Office Expenses:

Proportion of general expenses, transferred from Boylston street subway	\$14,220 24
Printing . . . . .	30 00
Stationery-supplies . . . . .	12 47

14,262 71

## Engineering Expenses:

Bethlehem Steel Company (Contract 443) .	\$24,545 25
Advertising . . . . .	10 51
Borings:	
Labor . . . . .	662 35
Material . . . . .	25 21
Chief Engineer . . . . .	3,375 00
Clerks . . . . .	610 40
Field supplies . . . . .	7,659 40
Fuel . . . . .	51 52
Furniture . . . . .	93 00
Inspection . . . . .	92 36
Instruments . . . . .	300 01
Labor . . . . .	6,152 48
Lighting . . . . .	369 37
Messengers . . . . .	312 30
Printing . . . . .	315 09
Rental . . . . .	1,166 66
Skilled service . . . . .	28,156 36
Stationery-supplies . . . . .	1,290 39
Stenographers . . . . .	2,239 74
Stock . . . . .	75,165 86
Teaming . . . . .	173 22
Telephone—telegraph . . . . .	87 90
Testing . . . . .	210 53
Tools . . . . .	3,836 73

156,901 64

## SECTION A.

*(From the end of the Cambridge Connection at the east line of  
Tremont street, under Winter street to about the west line of  
Washington street.)*

Coughlan & Sheils Company (Contract 433) .	\$252,003 45
New England Structural Company (Contract 431) . . . . .	8,736 64
Alterations . . . . .	2,469 30
Construction . . . . .	35,713 01
Damages . . . . .	1,145 82
Field supplies . . . . .	376 96
Fuel . . . . .	71 30
Furniture . . . . .	10 55
Inspection . . . . .	1,777 14
Instruments . . . . .	25 95
Insurance . . . . .	2,621 79
Labor . . . . .	8,906 03
Lighting . . . . .	311 61
Paving . . . . .	22 39
Printing . . . . .	28 25
Skilled service . . . . .	7,046 64
Stationery-supplies . . . . .	224 50

*Carried forward* . . . . . \$321,491 33 \$537,484 59

<i>Brought forward</i>	\$321,491 33	\$537,484 59
Teaming	69 21	
Telephone—Telegraph	122 23	
Testing	69 62	
Tools	107 24	
Water pipes	46 50	
	<hr/>	321,906 13

## SECTION B.

(From about the west line of Washington street, under Washington and Summer streets, to a point about 50 feet east of the east line of Arch street.)

Hugh Nawn Contracting Company (Contract 457)	\$54,383 09	
Coughlan & Sheils Company (Contract 438)	5,689 82	
Bethlehem Steel Company (Contract 443)	8,787 91	
Boston Bridge Works (Contract 445)	6,372 63	
Bethlehem Steel Company (Contract 449)	629 34	
Advertising	91 18	
Alterations	2,582 18	
Construction	11,934 82	
Damages	6,559 78	
Field supplies	115 46	
Fuel	11 15	
Furniture	10 00	
Inspection	111 44	
Instruments	78	
Insurance	728 01	
Labor	4,601 55	
Legal and expert advice	425 00	
Lighting	76 77	
Printing	250 20	
Rental	35 00	
Skilled service	1,979 07	
Stationery-supplies	46 22	
Teaming	56 05	
Telephone—telegraph	27 05	
Testing	52 35	
Tools	302 04	
Water pipes	448 56	
	<hr/>	106,307 45

## BOYLSTON STREET SUBWAY.

Office Expenses:	
Furniture	\$12 98
Lighting	80 50
Printing	297 75
Rental	3,000 00
Stationery-supplies	819 97
Telephone—telegraph	448 36
Stenographers	3,275 61
Messenger	1,150 85
Clerks	806 67
Salaries of Commissioners and Secretary	28,027 78
	<hr/>
	\$37,920 47

Transferred to Dorchester Tunnel \$14,220 24

Transferred to East Boston Tunnel

Extension 4,740 13

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18,960 37

---

18,960 10

*Carried forward* \$984,658 27

<i>Brought forward</i>		\$984,658 27
Engineering Expenses:		
Advertising	\$14 99	
Chief Engineer	4,500 00	
Clerks	634 22	
Field supplies	2,551 65	
Fuel	74 83	
Furniture	14 50	
Inspection	586 66	
Instruments	353 43	
Labor	7,485 91	
Legal and expert advice	229 00	
Lighting	885 59	
Messengers	460 53	
Printing	2,502 77	
Rental	3,583 34	
Skilled service	36,233 77	
Stationery-supplies	2,275 78	
Stenographers	2,548 87	
Stock	47,028 22	
Teaming	1,144 47	
Telephone—telegraph	304 41	
Testing	271 67	
Tools	1,712 44	
		115,397 05

## SECTION ONE.

*(From the easterly side of Kenmore street through Commonwealth avenue, the Fens, and Newbury street to the middle of Massachusetts avenue.)*

Hugh Nawn Contracting Company (Contract 427)	\$443,072 86	
Bethlehem Steel Company (Contract 426)	25 72	
Alterations	831 19	
Construction	103,502 04	
Damages	199 09	
Field supplies	219 80	
Fuel	35 02	
Inspection	1,165 58	
Instruments	42 95	
Labor	2,386 53	
Legal and expert advice	676 19	
Lighting	59 00	
Paving	315 25	
Skilled service	4,358 93	
Stationery-supplies	240 94	
Teaming	323 64	
Telephone—telegraph	84 39	
Testing	39 40	
Tools	45 79	
Water pipes	4,669 86	
		562,294 17

## SECTION TWO.

*(From the middle of Massachusetts avenue, under private property and Boylston street, to the easterly line of Hereford street.)*

Hugh Nawn Contracting Company (Contract 427)	\$28,154 87	
Hugh Nawn Contracting Company (Contract 432)	109,545 74	
Bethlehem Steel Company (Contract 443)	819 12	
<i>Carried forward</i>	\$138,519.73	\$1,662,349.49

<i>Brought forward</i>	\$138,519.73	\$1,662,349.49
Lewis F. Shoemaker & Company (Contract 444)	26,076 46	
Alterations	1,610 34	
Construction	38,893 07	
Field supplies	102 83	
Fuel	57 15	
Furniture	8 67	
Inspection	585 99	
Instruments	16 15	
Labor	2,235 69	
Legal and expert advice	680 00	
Lighting	28 09	
Printing	46 30	
Skilled service	1,841 55	
Stationery-supplies	107 66	
Teaming	201 50	
Telephone—telegraph	50 76	
Testing	11 14	
Tools	61 95	
		211,135 03

## SECTION THREE.

(From the easterly line of Hereford street, under Boylston street, to the westerly end of the Public Library.)

Hugh Nawn Contracting Company (Contract 432)	\$370,494 92	
Advertising	3 73	
Alterations	8 58	
Construction	103,811 63	
Damages	4,500 00	
Field supplies	290 13	
Fuel	20 27	
Inspection	1,440 86	
Instruments	27 54	
Labor	3,624 93	
Lighting	63 75	
Paving	1,908 16	
Printing	19 50	
Skilled service	4,841 07	
Stationery-supplies	202 05	
Teaming	455 95	
Telephone—telegraph	99 44	
Testing	201 05	
Tools	62 22	
		492,075 78

## SECTION FOUR.

(From the westerly end of the Public Library, under Boylston street, to about the center of Arlington street.)

Hugh Nawn Contracting Company (Contract 453)	\$333,112 04	
Bethlehem Steel Company (Contract 443)	1,117 10	
Levering & Garrigues Company (Contract 447)	6,351 36	
Levering & Garrigues Company (Contract 451)	14,555 59	
Advertising	74 63	
Borings:		
Labor	139 60	
Construction	33,766 42	
Field Supplies	121 05	
Fuel	37 00	

*Carried forward* . . . . . \$389,274.79 \$2,365,560.30

<i>Brought forward</i>	\$389,274.79	\$2,365,560.30
Inspection	585 44	
Instruments	42 72	
Labor	2,776 27	
Legal and expert advice	250 00	
Lighting	62 24	
Printing	235 10	
Skilled service	4,466 62	
Stationery-supplies	148 67	
Teaming	34 26	
Telephone—telegraph	26 77	
Test pits	9 78	
Testing	159 49	
Tools	20 75	
		398,092 90

## EAST BOSTON TUNNEL EXTENSION.

Office Expenses:		
Printing	\$20 00	
Proportion of general expenses transferred	4,740 13	
		4,760 13
Engineering Expenses:		
Isaac Blair & Company, Inc. (Contract 448)	\$129,770 62	
Bethlehem Steel Company (Contract 443)	345 87	
Bethlehem Steel Company (Contract 449)	84,605 61	
Advertising	2 40	
Alterations	120 44	
Cambridge street widening	30 28	
Chief Engineer	1,125 00	
Clerks	390 83	
Construction	33,768 23	
Field supplies	22,758 08	
Fuel	970 48	
Furniture	151 50	
Inspection	248 28	
Instruments	178 79	
Labor	5,113 49	
Legal and expert advice	180 00	
Lighting	4,402 50	
Messengers	44 43	
Paving	8 80	
Printing	14 00	
Rental	447 27	
Skilled service	13,904 07	
Stationery-supplies	276 43	
Stenographers	1,039 08	
Stock	5,171 28	
Teaming	191 48	
Telephone—telegraph	132 20	
Test pits	280 05	
Testing	279 23	
Tools	368 35	
		306,319 07

## INTEREST.

Boylston street subway	\$9,200 00	
Dorchester tunnel	5,333 33	
East Boston tunnel extension	3,866 67	
		18,400 00
<i>Carried forward</i>		\$3,093,132 40

<i>Brought forward</i> . . . . .		\$3,093,132 40
Dorchester Tunnel Extension:		
Office Expenses . . . . .	\$53 23	
Engineering Expenses . . . . .	466 96	
		520 19
Net increase . . . . .		<u>\$3,093,652 59</u>

## SUMMARY.

	From beginning of work to June 30, 1912.	June 30, 1912, to June 30, 1913.	Total.
Subway — Subway			
Commission . . . . .	\$14,131 16		\$14,131 16
Part of General Expenses . . . . .	117,550 71		117,550 71
Engineering and miscellaneous . . . . .	407,475 48		407,475 48
Section One . . . . .	239,407 12		239,407 12
Two . . . . .	363,605 50		363,605 50
Three . . . . .	300,639 36		300,639 36
Three and one-half . . . . .	9,355 70		9,355 70
Four . . . . .	469,620 33		469,620 33
Five . . . . .	388,955 49		388,955 49
Six . . . . .	327,541 86		327,541 86
Seven . . . . .	231,504 27		231,504 27
Eight . . . . .	95,902 06		95,902 06
Eight and one-half . . . . .	76,639 47		76,639 47
Nine . . . . .	299,452 07		299,452 07
Ten . . . . .	254,497 88		254,497 88
Eleven . . . . .	270,310 57		270,310 57
Interest . . . . .	258,575 60		258,575 60
	<u>\$4,125,164 63</u>		<u>\$4,125,164 63</u>
Transfer to Alterations, see 11th report . . . . .	4 95		4 95
Total . . . . .	<u>\$4,125,159 68</u>		<u>\$4,125,159 68</u>
Alterations—Part of			
General Expenses . . . . .	\$28,945 53		\$28,945 53
Section Three . . . . .	2,568 26		2,568 26
Four . . . . .	163 42		163 42
Five . . . . .	30,233 01		30,233 01
Seven . . . . .	178,516 16		178,516 16
Nine . . . . .	3 00		3 00
Ten . . . . .	534 04		534 04
Interest . . . . .	1,905 56		1,905 56
Transfer from Subway, see 11th report . . . . .	4 95		4 95
Total . . . . .	<u>\$242,873 93</u>		<u>\$242,873 93</u>



	From beginning of work to June 30, 1912.	June 30, 1912, to June 30, 1913.	Total.
Charlestown Bridge:			
Total . . . .	<u>\$1,570,197 98</u>		<u>\$1,570,197 98</u>

Investigation of Conges- tion of Traffic, etc. .			
Total . . . .	<u>\$3,015 92</u>		<u>\$3,015 92</u>

East Boston Tunnel— Part of General Ex- penses . . . .	\$161,134 78		\$161,134 78
Engineering Expenses .	191,466 57	\$562 63	192,029 20
Section A . . . .	98,869 09		98,869 09
B . . . .	1,387,259 25	11,126 62	1,398,385 87
C . . . .	\$485,167 83	\$23,024 94	\$508,192 77
D . . . .	244,954 26	1,600 00	246,554 26
E . . . .	188,201 14	2 13	188,203 27
F . . . .	241,986 56	1,806 86	243,793 42
Interest . . . .	248,156 88		248,156 88
Total . . . .	<u>\$3,247,196 36</u>	<u>\$38,123 18</u>	<u>\$3,285,319 54</u>

Boston Tunnel & Sub- way—Part of Gen- eral Expenses . .	\$226,441 57	\$45 00	\$226,486 57
Engineering Expenses	417,866 25	131 80	417,998 05
Section One . . .	756,483 62	3,369 35	759,852 97
Two . . . .	642,950 56	*1,237 06	641,713 50
Three . . . .	461,780 66	221,284 49	683,065 15
Four . . . .	1,788,849 91	*2,063 75	1,786,786 16
Five . . . .	1,043,442 74	31,457 10	1,074,899 84
Six . . . .	335,068 93	*638 56	334,430 37
Seven . . . .	139,466 40		139,466 40
Eight . . . .	616,253 51	*1 44	616,252 07
Nine . . . .	659,932 40	18,619 51	678,551 91
Ten . . . .	142,880 35		142,880 35
Eleven . . . .	345,493 91		345,493 91
Twelve . . . .	45,417 52		45,417 52
Interest . . . .	645,186 05		645,186 05
Total . . . .	<u>\$8,267,514 38</u>	<u>\$270,966 44</u>	<u>\$8,538,480 82</u>

Cambridge Connection:			
Office Expenses . .	\$62,355 20		\$62,355 20
Engineering Expenses	96,575 46	\$374 67	96,950 13
Section One . . .	527,404 96	33,223 77	560,628 73
Two . . . .	595,777 43	23,632 18	619,409 61
Interest . . . .	76,722 00		76,722 00
Total . . . .	<u>\$1,358,835 05</u>	<u>\$57,230 62</u>	<u>\$1,416,065 67</u>



	From beginning of work to June 30, 1912.	June 30, 1912, to June 30, 1913.	Total.
Dorchester Tunnel			
Office Expenses . . .	\$9,376 19	\$14,262 71	\$23,638 90
Engineering Expenses	28,243 66	156,901 64	185,145 30
Section A . . . . .	1,136 63	321,906 13	323,042 76
B . . . . .	1,915 57	106,307 45	108,223 02
C . . . . .	2,638 52		2,638 52
Interest . . . . .	*766 67	5,333 33	4,566 66
Total . . . . .	<u>\$42,543 90</u>	<u>\$604,711 26</u>	<u>\$647,255 16</u>
Boylston Street Subway			
Office Expenses . . .	\$31,605 93	\$18,960 10	\$50,566 03
Engineering Expenses	34,230 48	115,397 05	149,627 53
Section One . . . . .	128,678 84	562,294 17	690,973 01
Two . . . . .	100 00	211,135 03	211,235 03
Three . . . . .	31,132 69	492,075 78	523,208 47
Four . . . . .		398,092 90	398,092 90
Interest . . . . .	29,830 01	9,200 00	39,030 01
Total . . . . .	<u>\$255,577 95</u>	<u>\$1,807,155 03</u>	<u>\$2,062,732 98</u>
East Boston Tunnel Ex- tension:			
Office Expenses . . .	\$3,812 79	\$4,760 13	\$8,572 92
Engineering Expenses	3,990 64	306,319 07	310,309 71
Interest . . . . .	*511 11	3,866 67	3,355 56
Total . . . . .	<u>\$7,292 32</u>	<u>\$314,945 87</u>	<u>\$322,238 19</u>
Dorchester Tunnel Ex- tension:		\$520 19	\$520 19
Grand Total . . . . .	<u>\$19,120,207 47</u>	<u>\$3,093,652 59</u>	<u>\$22,213,860 06</u>

\* Decrease.

The report of the Chief Engineer is appended.

GEORGE F. SWAIN,	} <i>Boston Transit Commission.</i>
HORACE G. ALLEN,	
JOSIAH QUINCY,	
JAMES B. NOYES.	

## REPORT OF THE CHIEF ENGINEER.

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BOSTON, June 30, 1913.

GEORGE F. SWAIN, HORACE G. ALLEN, JOSIAH QUINCY,  
JAMES B. NOYES, *Boston Transit Commissioners.*

GENTLEMEN:—The report of work done on the Dorchester Tunnel, the Boylston-street Subway and the East Boston Tunnel Extension during the year ending June 30th is herewith submitted.

### DORCHESTER TUNNEL.

#### SURVEYS AND PLANS.

Additional surveys have been made extending from Dewey square to A street in South Boston, mostly in the vicinity of Fort Point Channel, and more study has been given to determine the best location for the tunnel in this locality. Eight alternative routes were carefully investigated. The route selected differs from that described in the last Annual Report and is shown on the map, Plate 1, accompanying this report, and is approximately the one designated R-2 on Plate 2. This route passes through Dewey square, down Summer street in front of the South Terminal Station and then, curving towards the south, passes under Fort Point Channel and private property until it reaches Dorchester avenue near Broadway in South Boston. Authorization by the Secretary of War was given June 11, 1913, for the construction of the portion of the tunnel under the harbor on this route. A new plan showing the location as approved was filed June 27, 1913, in the office of the Commissioner of Public Works. The location of a station in Dewey square and the grade of the portion of the tunnel from the easterly end of Section B to the harbor line depends largely upon the route to be adopted under the

harbor. Plans for construction of this section will be prepared as soon as practicable. Considerable study has been given to the details of the cross-section, profile and location of the tunnel in Dorchester avenue between Old Colony avenue and Andrew square.

The contract plans for Section B, except those relating to the entrances and exits to the station, were finished about April 1, 1913. A very large number of studies and detail plans have been made for the entrances and exits to the station located in Summer street between Hawley and Arch streets.

Several studies were made of the detail alignment, profile and cross-section of the tunnel in Summer street between Arch street and Dewey square.

#### BORINGS.

Additional borings have been made to an average depth of about 60 feet to determine the character of the earth in the locality where the tunnel may be built. The Charles R. Gow Company was the contractor. The borings were two inches in diameter and were located as follows:

Nine borings in and near Summer street between Kingston street and Dorchester avenue.

Ten borings in South Boston near A street between Summer street and Dorchester avenue.

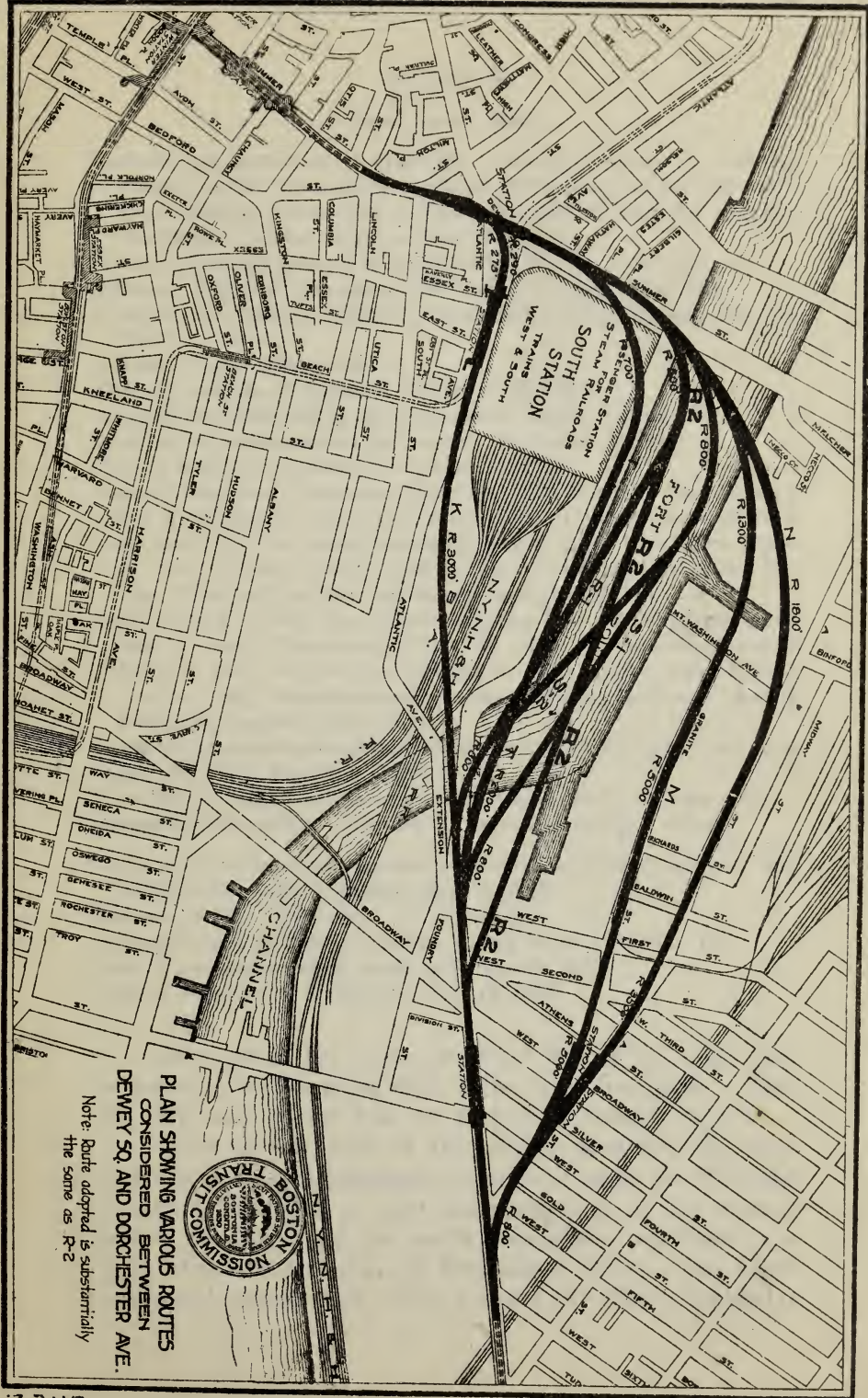
Five borings in and near the Fort Point Channel.

Two borings in Dorchester avenue between B and D streets.

The Summer street borings indicate the ground to be hard sand, gravel and clay. The borings in South Boston near A street and those in and near Fort Point Channel show a layer of clay overlaying a bed of hardpan. This hardpan is at a depth of about 65 or 70 feet below mean low water near the channel and rises to a depth of about 40 feet below mean low water at Mount Washington avenue and A street, and to a depth of about 2 feet below mean low water at Broadway and A street.

The borings in Dorchester avenue show sand and gravel overlaying a bed of blue clay from 20 to 35 feet below the surface.





PLAN SHOWING VARIOUS ROUTES  
CONSIDERED BETWEEN  
DEWEY SQ. AND DORCHESTER AVE.

Note: Route adopted is substantially  
the same as R-2





## SECTION A.

*Construction Data.*

Location and description of structures: Two-track subway of reinforced concrete and structural steel in Winter street, from the easterly end of the Cambridge Connection in Tremont street to near the center of Washington street, a length of about 500 feet.

Plates in this and previous annual reports: XVIII., 1, 6; XIX., 3, 4.

Assistant Engineer in charge of construction: G. Dana Emerson.

Contractor and date of contract: Coughlan & Sheils Company, May 24, 1912.

Amount of bid: \$241,475.00.

Date of extension of contract: November 26, 1912.

Appendix showing bids in previous annual report: XVIII., DD.

Date of completion named in contract: December 31, 1912.

Date of certificate of completion: April 14, 1913.

Dates of beginning: Excavation, May 30, 1912; Concrete, June 18, 1912.

Dates of completion: Excavation, June 4, 1913; Concrete, June 19, 1913.

Amount of work done during year ending June 30, 1913: Excavation, 26,905 cu. yds.; Concrete placed, 9,868 cu. yds.; Structural steel placed, 244 tons; Steel rods used for reinforcing concrete, 327 tons.

Total amount of work done to and including June 30, 1913, from beginning of work: Excavation, 31,234 cu. yds.; Old masonry removed, 2,802 cu. yds.; Concrete placed, 9,962 cu. yds.; Cinder concrete filling, 1,142 cu. yds.; Structural steel placed, 244 tons; Steel rods used for reinforcing concrete, 327 tons.

Number of men ordinarily employed by the contractor during year ending June 30, 1913: Day, 90; Night, 80.

Character of earth found in excavation: Gravel, sand and sandy clay.

Disposition of surplus: Delivered to scows and dumped at sea.

Contractor for furnishing structural steelwork and date of contract: New England Structural Company, May 3, 1912.

Amount of bid: \$7,942.00.

Appendix showing bids in previous annual report: XVIII., BB.

Date of completion named in contract: June 20, 1912.

Date of certificate of completion: July 19, 1912.

This section has been completed during the past year, as stated in the foregoing data. The work done prior to June 30, 1912, was described in the Eighteenth Annual Report.

Under an extension of the original contract, the main structure and south passageway were built under the Washington-street Tunnel to a point below the edge of the Summer station platform, and the north passageway was built to a point about 50 feet east of Washington street. The above mentioned passageways are to connect the Winter station of



the Washington-street Tunnel with the two platforms of the Dorchester Tunnel station under Summer street.

As the tunnel occupies the full width of Winter street, the buildings on each side of the street had to be underpinned to the depth of the bottom of the tunnel. Plate 3 shows the method used for temporarily supporting the columns of the Sawyer building in order to underpin them with concrete. Plate 4 shows conditions in Winter street at 1.05 P.M., November 16, 1912. The excavation is bridged over with heavy plank-ing supported by timbering. Most of the work on this section was done at night, when there was little traffic and the bridging could be removed.

## SECTION B.

### *Construction Data.*

Location and description of structures: A two-platform station with lobby above, and connections with the Washington-street Tunnel. This section extends from Washington street to Arch street.

Plates in this report: 5 and 6.

Assistant Engineer in charge of construction: G. Dana Emerson.

Contractor and date of contract: Hugh Nawn Contracting Company, March 31, 1913.

Amount of bid: \$351,048.00.

Appendix showing bids in this report: Y.

Date of completion named in contract: March 31, 1914.

Dates of beginning: Excavation, April 1, 1913; Concrete, April 28, 1913.

Amount of work done during year ending June 30, 1913: Excavation, 15,000 cu. yds.; Old masonry removed, 1,050 cu. yds.; Standard concrete placed, 1,300 cu. yds.; Cinder concrete placed, 770 cu. yds.; Structural steel placed, 20 tons; Steel rods used for reinforcing concrete, 26 tons.

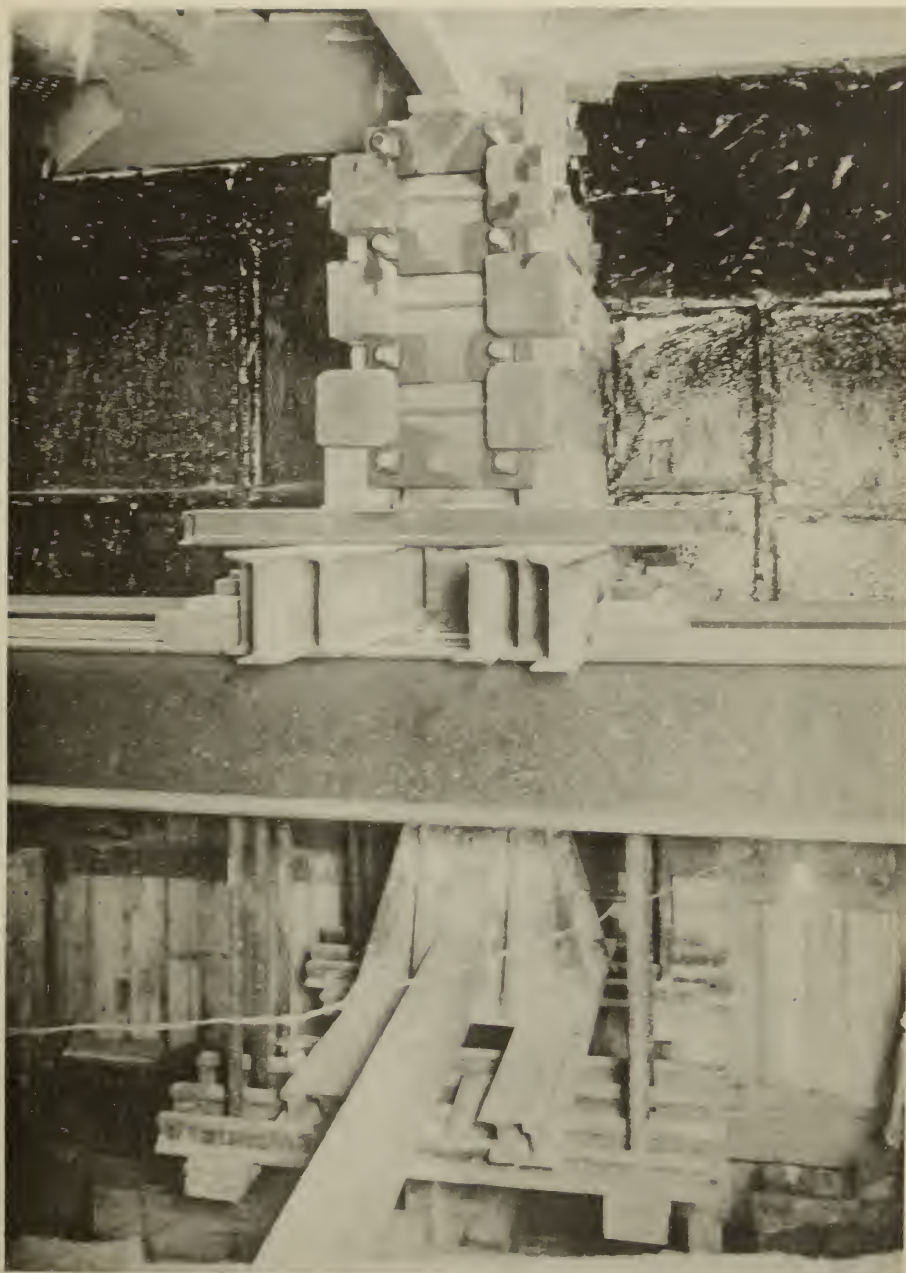
Number of men ordinarily employed by the contractor during year ending June 30, 1913: Day, 160; Night, 85.

Character of earth found in excavation: Sand and clay.

Disposition of surplus: Some has been used for filling, in South Boston, and some has been delivered to scows and dumped at sea.

Contractors for furnishing structural steelwork and dates of contracts: Boston Bridge Works, September 30, 1912; Bethlehem Steel Company, December 12, 1912.

During the summer of 1912, previous to the letting of the main contract for Section B, the owners of the property at the northeast corner of Summer and Hawley streets were making extensive alterations in the building. In order to lessen the

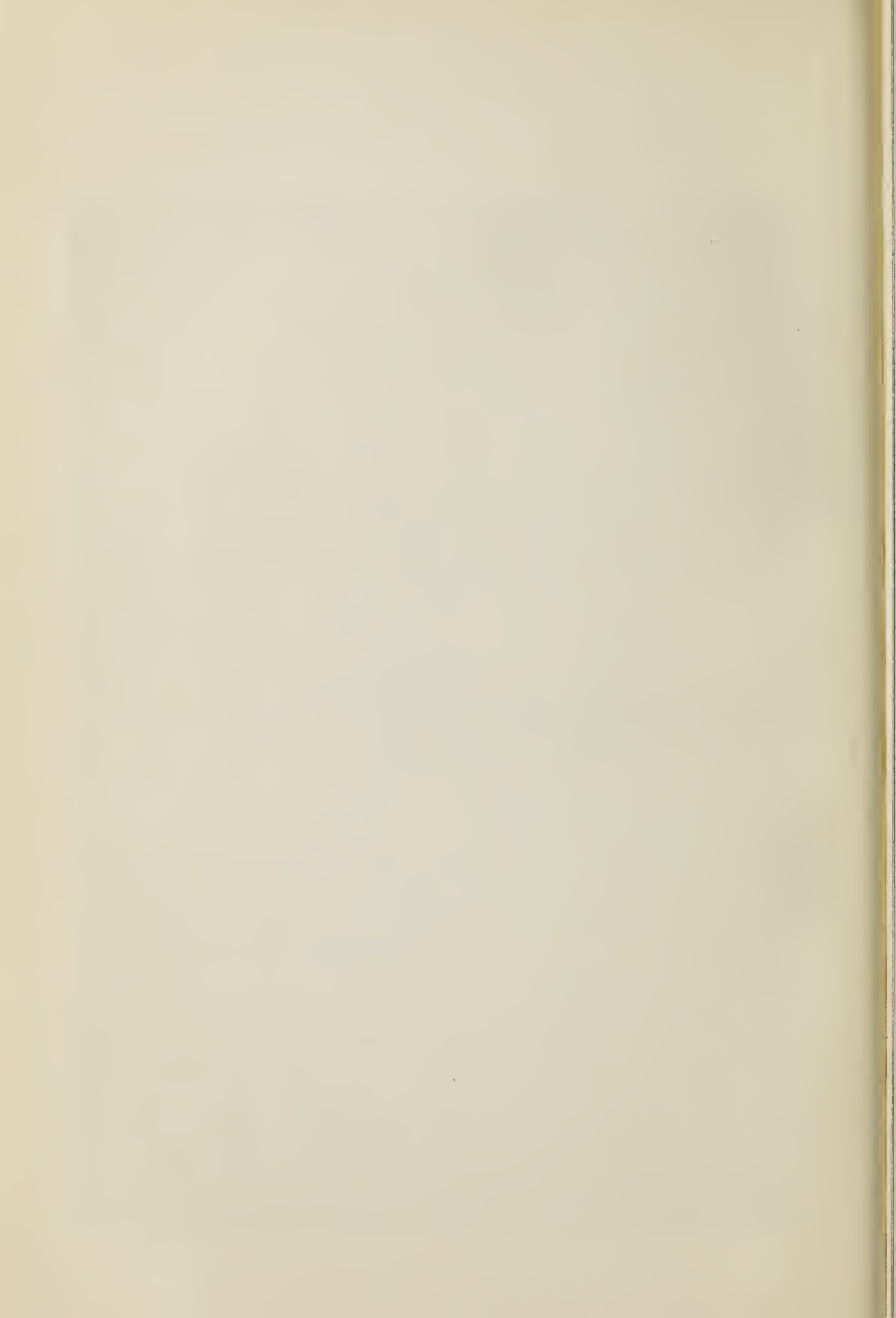


DORCHESTER TUNNEL, SECTION A. A METHOD OF TEMPORARILY SUPPORTING A COLUMN OF THE SAWYER BUILDING IN ORDER TO UNDERPIN IT WITH A CONCRETE PIER.

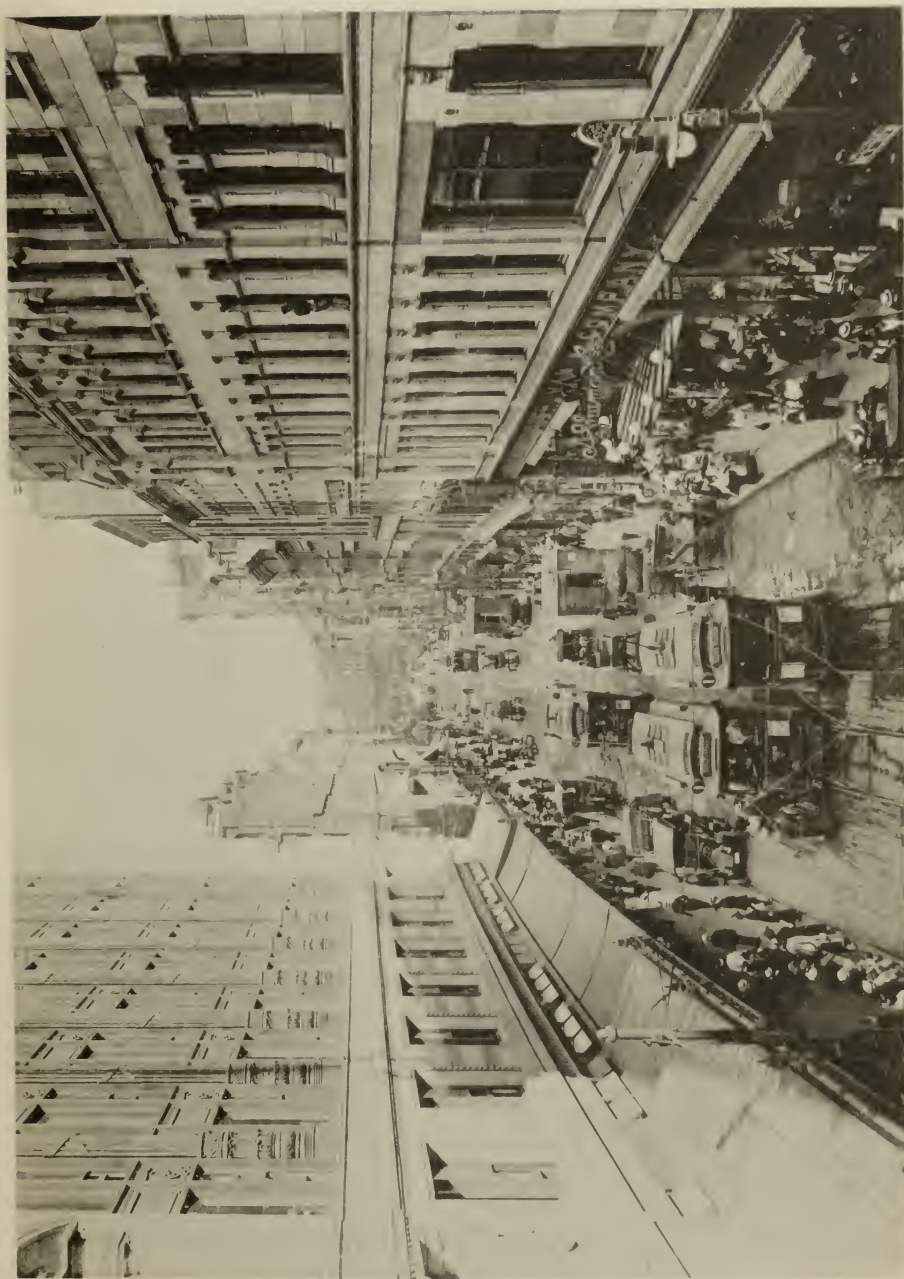




DORCHESTER TUNNEL, SECTION A. TRAFFIC ON WINTER STREET, SATURDAY, NOVEMBER 16, 1912, 1.05 P. M. EXCAVATION UNDER THE STREET IS COVERED WITH HEAVY PLANKING IN WHICH ARE OPENINGS FOR VENTILATION.







DORCHESTER TUNNEL, SECTION B. NORMAL CONDITION OF TRAFFIC ON SUMMER STREET. FOR THE ENTIRE WIDTH THE SURFACE OF THE STREET IS SUPPORTED ON HEAVY WOODEN TIMBERS. SUBWAY CONSTRUCTION IS IN PROGRESS BELOW.





annoyance to the tenants of the building, advantage was taken of this situation to do, at the same time, the underpinning which was necessary on account of the construction of the tunnel. The contract for this underpinning was awarded to the Coughlan & Sheils Company on August 21, 1912. (See appendix L for canvass of bids.) The building alterations, being carried on by the owners, were not advanced enough to permit the Coughlan & Sheils Company to begin its work until September 28, 1912.

The work consisted of underpinning about 40 feet of the Summer street building front and one column on Hawley street, to a depth of about 39 feet below the surface of Summer street. The excavation for a depth of about 30 feet was sand and clay. The next 6 or 7 feet was wet fine sand. Below this sand stiff blue clay was found extending to the bottom of the excavation. The underpinning, which was carried to the depth of the proposed adjacent tunnel wall, was done with concrete. This work was completed on December 17, 1912, and cost about \$5,700.

Construction work was begun on the main contract for Section B, April 1, 1913, and is progressing as rapidly as the safety and convenience of the public will permit. The supporting of the buildings along the line of the work is being done by Isaac Blair & Company, Inc., under a sub-contract.

Section B extends from the end of Section A, near the junction of Summer and Washington streets, easterly under Summer street about 550 feet to the easterly side of Arch street. Plate 5 shows a portion of Summer street under which the tunnel station is being constructed. The station is a two-story structure with two tracks and two side platforms below and a lobby for ticket offices, etc., above. Plate 6 shows a typical cross-section. Passageways leading from the westerly end of each platform pass under the Washington-street Tunnel and connect with the present Winter station of said tunnel. The westerly end of the lobby connects at grade with the present Summer station lobby and platform of the Washington-street Tunnel. The present stairways, in the New Filene Building, from the street will serve both the Washington-street Tunnel and the Dorchester Tunnel stations. Another stairway from the lobby level of the new station to the street surface will be located at Chauncy street near the easterly end of the station. Two stairways connect each platform of the station

with the lobby above. On the north side one is under Hawley street and the other is under Arch street. On the south side one stairway is under Chauncy street and the other is under the basements occupied by the Jordan Marsh Company and C. F. Hovey & Company. In addition it is proposed to have two inclined elevators, one from the north platform to the surface at Hawley street and the other from the south platform to the surface at Chauncy street.

The Dorchester Tunnel was necessarily located at a sufficient depth to cross under the Washington-street Tunnel, which location brings the bottom about 42 feet below the surface of the street, and this in turn makes it necessary to underpin all the buildings along the line of the work to an average depth of about 25 feet below their original foundations, except the New Filene Building, the foundations of which extend to a greater depth than the tunnel.

Two new cast iron sewers, located one on each side of the street below the sidewalks and directly above the station platforms and passageways, will take the place of the original sewers.

### BOYLSTON STREET SUBWAY.

During the year under review, substantial progress has been made toward the completion of the Boylston-street Subway. About one mile of subway, or 65% of the total length from Kenmore street to the proposed temporary connection with the Tremont-street Subway near Carver street, is finished at this date. This comprises all of the Boylston-street Subway from the incline at Kenmore street to Berkeley street, with the exception of the stations at Massachusetts avenue and Copley square and about 200 feet of uncompleted subway at Copley square, all of which are in progress of construction.

The act of the Legislature, authorizing the construction of the Boylston-street Subway, fixed the route definitely, requiring a station at or near the corner of Boylston and Tremont streets, and a terminus at Park street. Many studies for the arrangement of tracks between Park square and Park street have been made, having in view the best possible arrangement for the transfer of passengers at the stations, and for the transfer of cars between different routes. Perhaps one of the best studies considered, and one which required compara-

tively few alterations of the old subway, contemplated the addition of a two track subway under Boylston street between Charles street and Tremont street; an additional platform and slight modifications of the Boylston-street station of the old subway; a single-track subway on each side of the old subway between Boylston and Park-street stations, and an enlargement of the present Park-street station to the west and south. Further work on these studies has been suspended until the Commission makes its report in regard to alteration of the route of the Boylston-street Subway by some route to Post Office square as authorized by chapter 810, acts of 1913.

### GROUND WATER.

For practically its entire length some portion of the Boylston-street Subway is below the level of the ground water in the Back Bay. At the Fens the structure is entirely submerged, and about seventy per cent. of the subway west of Charles street will be below elevation 108, the approximate height of the water in the Charles River Basin. The subway excavation therefore has necessitated the removal of large quantities of ground water before the excavation could be carried to grade and the concrete structure placed in position. As stated in the Eighteenth Annual Report, a temporary pump well was installed on the west bank of the Fens into which the underdrains to the west discharged until the excavation was continued across the Fens as far as the permanent pump well at Charlesgate East. All of the ground water was then conducted into the permanent pump well through the underdrains. The underdrains were three in number, an 8-inch pipe in the center and a 6-inch pipe on each side. At the time of maximum pumping about two cubic feet of ground water per second was being removed by two 6-inch piston pumps and one 6-inch and one 3-inch centrifugal pump operated by compressed air. This water was strongly impregnated with sulphuretted hydrogen.

The method of stopping the flow of water from the underdrains into the pump well at the Fens, after the completion of this section of the subway, may be described as follows:—

A built-up wooden slab about two feet square was constructed, pierced in the center by a 4-inch iron pipe in which was set a gate valve. On the other side of the slab from the gate rings of packing were placed to insure a tight fit against



the concrete wall. Everything being ready, the slab was securely braced by timbers from the opposite wall against the concrete around the opening into the pump well through which the water was discharging, the open 4-inch pipe preventing the water at the underdrains from accumulating to a great head. The gate was then shut and the underdrains were immediately filled with grout through pipe previously placed in position in the invert of the subway. After sufficient time had elapsed for the grout to set, the temporary dam described above was removed.

## SECTION 1.

### *Construction Data.*

Location and description of structures: Two-track subway, mainly of reinforced concrete, from Commonwealth avenue at the easterly side of Kenmore street to the center of Massachusetts avenue, a length of 1936 feet.

Plates in this and previous annual reports: XVIII., 2, 7, 8, 9; XIX, 7, 8. Assistant Engineer in charge: Laurence B. Manley.

Contractor and date of contract: Hugh Nawn Contracting Company, March 14, 1912.

Amount of bid: \$532,540.00.

Appendices showing bids in previous annual report: XVIII., Y.

Date of completion named in contract: April 1, 1913.

Date of certificate of completion: March 17, 1913.

Dates of beginning: Excavation, March 12, 1912; Concrete, May 20, 1912.

Dates of completion: Excavation, February 1, 1913; Concrete, February 19, 1913.

Amount of work done during year ending June 30, 1913: Excavation, 57,025 cu. yds.; Concrete placed, 21,700 cu. yds.

Total amount of work done to and including June 30, 1913, from beginning of work: Excavation, 85,300 cu. yds.; Old masonry removed, 290 cu. yds.; Standard concrete placed, 24,440 cu. yds.; Structural steel placed, 97.9 tons; Steel rods used for reinforcing concrete, 1,065 tons.

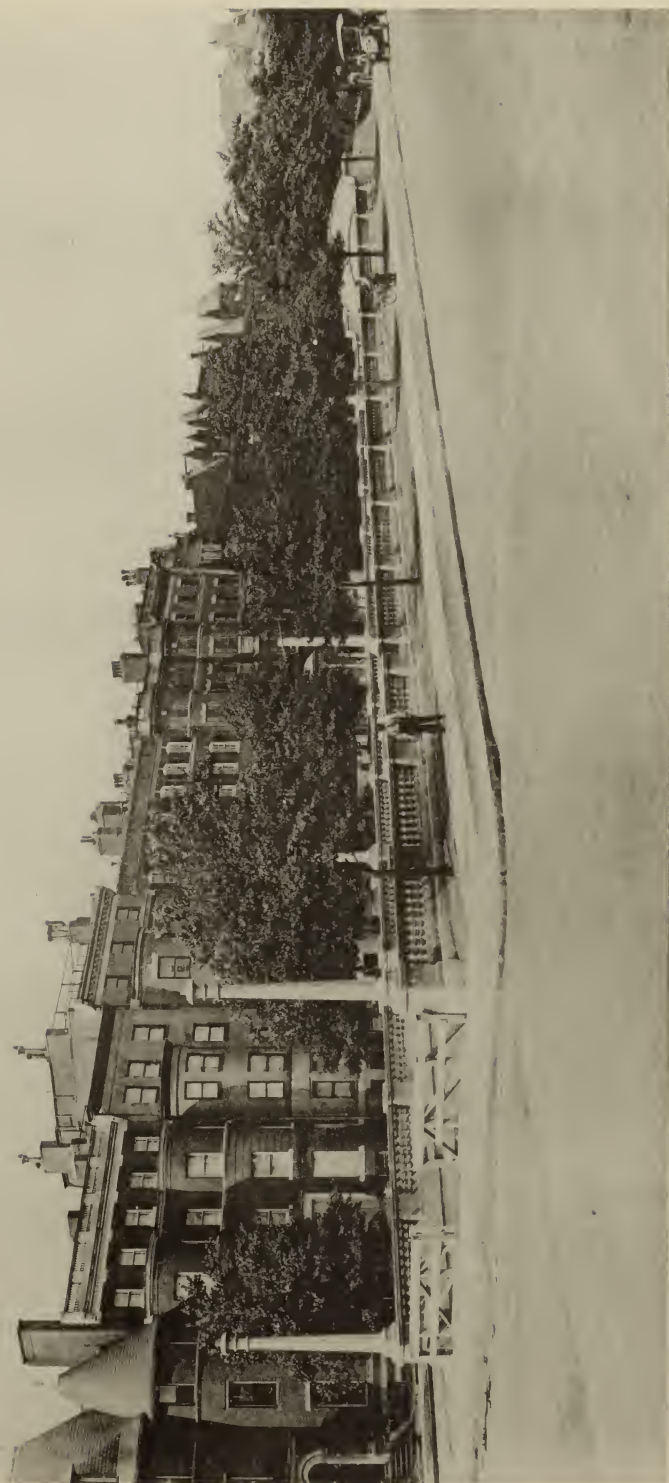
Number of men ordinarily employed by the contractor during year ending June 30, 1913: Day, 375; Night, 1.

Character of earth found in excavation: Gravel filling over a layer of silt. Below the silt is a layer of sand and gravel, carrying large quantities of water, and below this is hard blue clay.

Disposition of surplus: To Fenway in rear of Museum of Fine Arts, to Fenway at corner of Commonwealth avenue and Charlesgate West, and to Metropolitan Park at Cottage Farm, Allston.

Contractor for furnishing structural steelwork and date of contract: Bethlehem Steel Company, March 14, 1912.

Amount of bid: \$2,887.50.

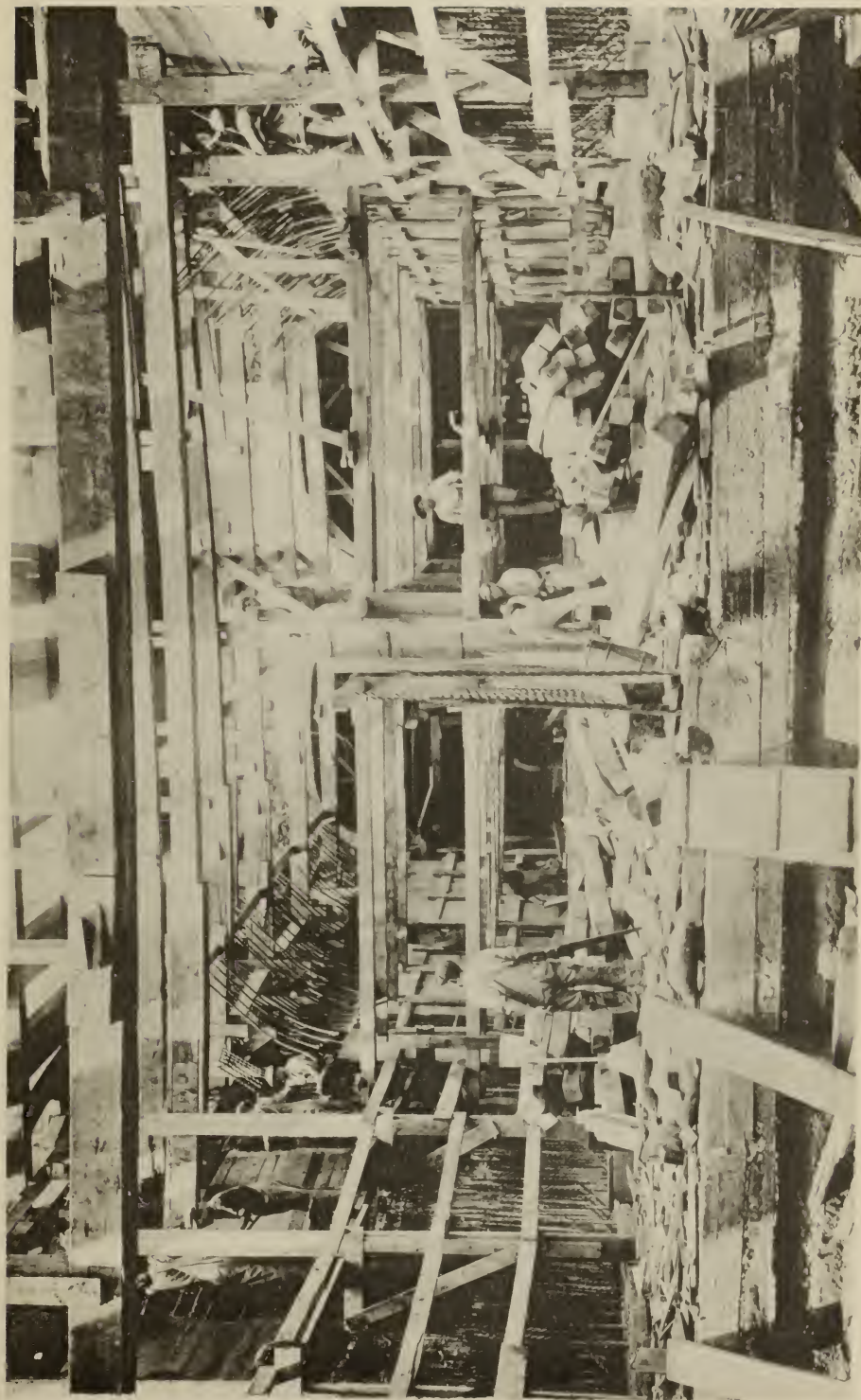


HELIOTYPE CO., BOSTON.

BOYLSTON STREET SUBWAY, SECTION 1. INCLINE ON COMMONWEALTH AVENUE JUST EAST OF KENMORE STREET.







BOYLSTON STREET SUBWAY, SECTION 1. CONSTRUCTION IN THE FENS, BELOW THE LEVEL OF THE CREEK BED.  
STATION 8 + 25, LOOKING WESTERLY.



Date of completion named in contract: April 15, 1912.

Date of certificate of completion: April 23, 1912.

Contractor for building concrete balustrade around the incline near Kenmore street: (See Plate 7.) Emerson & Norris Company.

Date of contract: April 7, 1913.

Amount of bid: \$4,412.00.

Appendix in this report showing bids: R.

Date of completion named in contract: May 15, 1913.

Date of certificate of completion: June 21, 1913.

### CONSTRUCTION.

The open incline located in the grass plot of Commonwealth avenue near Kenmore street (see Plate 7) has been completed with a concrete balustrade on the walls and an ornamental arch over the portal. The design for this work was furnished by Mr. A. A. Shurtleff, landscape architect for the Park Department. The concrete walls of the subway structure below the balustrade are rough pointed and the coping is crandalled to give the desired rough effect. The balustrade is made of concrete, mixed in the proportion of two parts of fine crushed dark Quincy granite to one part of cement, with a rough surface obtained by washing off the surface cement, thus revealing the aggregate before the concrete became entirely set. The balusters were constructed in sand moulds at the shop and set in place on the work. The posts, rails, and ornamental trolley post casings were built in place on the walls and reinforced with small steel rods.

Some of the obstructions encountered in the construction of Section 1 of the subway have been the Back Bay Fens and the Stony Brook Conduit, beneath which the subway passes at Charlesgate East. Construction through the Fens was between lines of interlocking steel sheet piling within a coffee-dam, as described in the last Annual Report. The construction of the subway at this place is shown on Plate 8. The Fens Pond is an estuary of the Charles River and has little or no current except during heavy rain storms. Practically all of the flow now passes through a covered conduit known as the Stony Brook Conduit, consisting of two barrels, one of horse-shoe section 12 feet in its vertical diameter, and another of circular section 7 feet in diameter. This conduit connects with the Boston Marginal Conduit at the gate house near the intersection of Charlesgate East and Back street, is built of

brick and concrete, and rests on a plank platform supported on piles. The cross-section of the subway under the conduit has the usual inside dimensions. The center wall and roof are reinforced by means of structural steel frames made of 8-inch Bethlehem beams set 12 inches on centers. The thickness of roof between the clearance line of the subway and the bottom of the sewer is about 12 inches. Construction under the conduit was carried on in the following stages: First;—A center drift was carried through from the excavation west of the conduit to the excavation east of it, back of the Hotel Somerset. This drift was extended upward to the bottom of the conduit and the center wall was placed in the drift, the old piles supporting the conduit being left in position until concreting operations were begun. Second;—Drifts for the north and south side walls were carried under and across the width of the conduit in the same manner and the concrete side walls constructed therein. Third;—The remaining earth cores between the center and side walls were removed and the old piles which remained were cut out, the structural steel roof beams being set in place to support the conduit as fast as each bent of piles was removed. The under side of the Stony Brook Conduit was covered with waterproofing. The roof was concreted as thoroughly as possible by ramming the concrete in from the ends, and afterwards was grouted full through 2-inch pipes left for the purpose between the bents of steel work. This work was hampered by a large quantity of water which entered the side wall excavation through an old underdrain, parallel to and directly below the Stony Brook Conduit. The underdrain had previously been cut and plugged at a point about 100 feet north of the subway. The water which continued to come in was collected in a 3-inch iron pipe and conducted to the pump well, until the work below the conduit was completed, when the pipe was capped outside of the lines of the work.

#### CONSTRUCTION IN NEWBURY STREET OPPOSITE HOTEL SOMERSET AND HOTEL EASTGATE.

Where the Boylston-street Subway curves from the Fens into Newbury street its north wall at one point touches the property line of the Hotel Somerset, and comes within 7 feet of the building proper, which is a brick and stone building seven



stories high. On the opposite side of the street is the Hotel Eastgate.

Partly on account of the general settlement of the ground in the Back Bay district, and partly on account of the construction of the Stony Brook Conduit in Charlesgate East, the walls of the Hotel Somerset on the Newbury street side, previous to any subway construction, were found to be cracked, and the southwesterly corner of the building lower than the northwesterly corner. At this place the bottom of the subway is about 40 feet below the surface of the street, and deeper than the bottom of the piles supporting the hotel. As any underpinning of the building would necessitate cutting through the walls and the floor, thereby making openings into the private ballroom which occupies the southwesterly portion of the lower floor, and as the tightest temporary partitions would not prevent sound and dust from construction work nor the odor of sulphuretted hydrogen from the deep excavation from pervading the hotel, it was decided not to enter the premises and underpin the foundations of the building, but to take extraordinary precautions to prevent any movement of the ground below the wooden piles upon which the building rests. These precautions consisted in driving a solid wall of interlocking steel sheet piling 35 feet deep on the outside lines of the subway excavation for the full length of the Newbury street face of the hotel, with wing walls extending 50 feet along the Charlesgate East fronts of both hotels, and in filling the gravel below the piles on the outside of the steel sheeting with cement grout forced in under high pressure.

## SECTION 2

### *Construction Data.*

Location and description of structures: Massachusetts-avenue station and two-track subway of reinforced concrete and structural steel, from center of Massachusetts avenue, Sta. 19 + 36, to easterly line of Hereford street, Sta. 27 + 50, a distance of 814 feet.

Plate in this report: 9.

Assistant Engineer in charge: Laurence B. Manley.

Contractor and date of contract: Hugh Nawn Contracting Company.

(On June 13, 1912, the contract for the construction of Section 1 was extended, at the same unit prices, to include the Massachusetts-avenue station, and the contract for the construction of Section 3 was similarly extended to include the rest of Section 2.)



Date of completion named in contract: Within 8 months from date on which contractor is notified to begin work.

Date of certificate of completion for extension of Section 3: March 14, 1913.

Dates of beginning: Excavation for Section 1 extension, December 21, 1912; for Section 3 extension, August 21, 1912; Concrete for Section 1 extension, December 24, 1912; for Section 3 extension, September 24, 1912.

Dates of completion: Excavation for Section 1 extension, in progress; for Section 3 extension, January 23, 1913; Concrete for Section 1 extension, in progress; for Section 3 extension, March 1, 1913.

Total amount of work done to and including June 30, 1913: Excavation, 5,932 cu. yds. for Section 1 extension and 14,580 cu. yds. for Section 3 extension; Old masonry removed, 370 cu. yds. for Section 1 extension and 1,397 cu. yds. for Section 3 extension; Standard concrete placed, 1,110 cu. yds. for Section 1 extension and 6,501 cu. yds. for Section 3 extension; Structural steel placed, 37 tons for Section 1 extension; Steel rods used for reinforcing concrete, 62 tons for Section 1 extension and 394 tons for Section 3 Extension.

Number of men ordinarily employed by the contractor during year ending June 30, 1913: On Section 1 extension, from December 19, 1912, to February 20, 1913, 55, and from May 5, 1913, to June 30, 1913, 75; on Section 3 extension, Day, 55; Night, 25.

Character of earth found in excavation: Silt over a layer of sand and gravel.

Disposition of surplus: By steam railroad to Metropolitan Park at Cottage Farm, Allston.

Contractor for furnishing structural steelwork and date of contract: Lewis F. Shoemaker & Company, September 30, 1912.

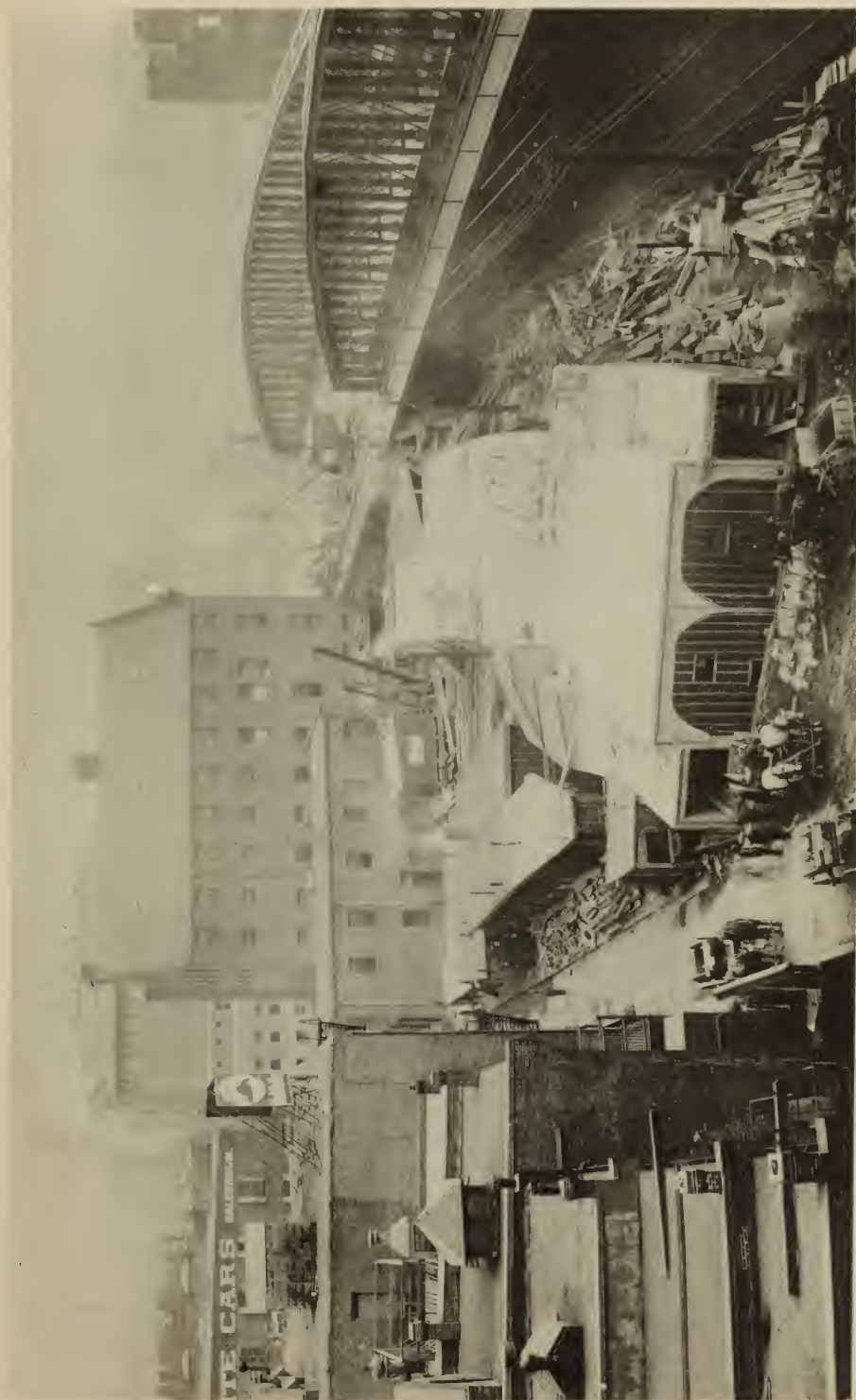
Amount of bid: \$18,333.00.

Appendix showing bids in this report: Q.

Date of completion named in contract: Within 30 days after receipt of all Bethlehem shapes.

## CONSTRUCTION.

The part of Section 2 embraced in the extension of the contract for Section 3 extends from Public Alley 444 through the yard formerly occupied by the Public Works Department, under a portion of the Police and Fire Engine stations to Boylston street at Hereford street. Plate 9 gives a general view of this work. A small amount of work was done on the part of Section 2 embraced in the extension of the contract for Section 1, or the Massachusetts-avenue station, in the fall of 1912, but work was suspended through the winter, partly on account of the weather and partly on account of the negotiations in regard to the removal of the Boston Cab Company



BOYLSTON STREET SUBWAY. PART OF SECTION 2 INCLUDING INCOMPLETED APPROACHES AT EASTERLY  
END OF THE LOCATION FOR THE MASSACHUSETTS-AVENUE STATION.



Building located at the corner of Massachusetts avenue and Newbury street.

On September 24, 1912, an easement taking was made of a portion of the Boston Cab Company Building and of portions of the basements of seven stable properties on Newbury street through which basements the subway passes. On April 3, 1913, the building being found in unsafe condition, the whole of the Boston Cab Company property was taken by the Commission, after which the building was torn down and construction on the subway station begun.

#### FOUNDATIONS.

The ground at this section is a soft silt about 10 feet in thickness resting on firm gravel which overlies the clay. Wherever it was possible to do so, piles were driven for a foundation, but in places beneath existing buildings a substitute foundation was constructed, consisting of longitudinal concrete walls or piers beneath the walls of the subway, carried to the solid gravel. This gravel offers so great a resistance to driving piles that in every case where excavation was made for the piers, which excavation contained old piles, it was found that they were driven only to the gravel, with practically no penetration into that material.

#### OCCUPATION OF STABLE OF POLICE DEPARTMENT.

The construction of a portion of this section of subway made necessary the removal of a portion of the stable of the Police Department, also the taking of a portion of the basement under the Police Building proper, and a similar taking of the basement of the building occupied by the Fire Department on the corner of Boylston and Hereford streets. The horses of the Police Department have been temporarily stabled elsewhere, and plans for rebuilding the stable with garage have been prepared to take the place of the old stable. This new building will rest partly on the subway roof, will have an entrance from Boylston street, and will be partly in the yard taken from the Public Works Department by the Transit Commission to the west of the old stable. The erection of the new stable also involves remodelling what is left of the present building.

## SECTION 3.

*Construction Data.*

Location and description of structures: Two-track subway of reinforced concrete, from easterly line of Hereford street, Sta. 27 + 50 to about 213 feet east of Exeter street, Sta. 46 + 30, a distance of 1880 feet.

Plates in this and previous annual reports: XVIII., 2, 7; XIX., 10.

Assistant Engineer in charge: Laurence B. Manley.

Contractor and date of contract: Hugh Nawn Contracting Company, May 9, 1912.

Amount of bid: \$413,135.00.

Appendices showing bids in previous annual report: XVIII., CC.

Date of completion named in contract: April 1, 1913.

Date of certificate of completion: February 18, 1913.

Dates of beginning: Excavation, May 13, 1912; Concrete, June 1, 1912.

Dates of completion: Excavation, January 20, 1913; Concrete, February 18, 1913.

Amount of work done during year ending June 30, 1913: Excavation, 64,622 cu. yds.; Standard concrete placed, 22,967 cu. yds.

Total amount of work done to and including June 30, 1913, from beginning of work: Excavation, 76,315 cu. yds.; Old masonry removed, 648 cu. yds.; Standard concrete placed, 24,395 cu. yds.; Structural steel placed, about 19 tons; Steel rods used for reinforcing concrete, 1,735 tons.

Number of men ordinarily employed by the contractor during year ending June 30, 1913: Day, 250; Night, 127.

Character of earth found in excavation: Gravel filling over a layer of silt. Below the silt is a layer of sand and gravel, carrying large quantities of water, and below this is hard blue clay.

Disposition of surplus: By steam railroad to Metropolitan Park at Cottage Farm, Allston, and to Fenway in rear of Museum of Fine Arts.

Contractor for bitulithic paving and date of contract: Warren Brothers Company, June 26, 1913.

Amount of bid: \$14,100.00.

Appendix showing bids in this report: DD.

Date of completion named in contract: July 1, 1913.

## CONSTRUCTION.

The method of construction of Section 3 consisted; first, in excavating for and constructing the north and south side walls; second, in excavating the remaining earth core to a depth of about 9 feet and constructing the roof; third, in removing the remaining excavation below the roof and in constructing the concrete invert. The side walls and roof were built in sections 40 feet in length. Plate 10 is a view in Section 3, looking westerly, showing the double arch of Section 2. The street car service was maintained throughout the construction





HELIOTYPE CO., BOSTON.

BOYLSTON STREET SUBWAY, SECTION 3. STATION 29 - 50, LOOKING WESTERLY.



of Section 3, except that during the construction of the sewer at Hereford street, which crosses below the subway at that point, the heavy semi-convertible cars were temporarily diverted by way of Huntington avenue.

Some of the difficulties in construction came from the excessive amount of water to be pumped and the maintenance and care of the Fairfield and the Hereford street sewers. The 36-inch by 48-inch sewer, crossing the subway at Fairfield street, was carried in a temporary wooden flume until a siphon at this crossing was completed. The siphon consists of two concrete manholes on either side of the subway, connected below the subway by means of two 36-inch iron pipes. There are center partitions in the manholes, so that either pipe can be pumped out and cleaned without interfering with the flow in the other. The flow from the Fairfield street sewer can also be conducted on the south side of the subway through a concrete sewer 4 feet wide and 8 feet 4 inches high, built by the Commission, which connects at Hereford street with another sewer. This Hereford street sewer was rebuilt where it crosses the subway location, the reconstructed sewer being composed of three chambers, each 3 feet 8 inches by 7 feet 6 inches, passing under the subway and joining the horse-shoe shaped sewer, 6 feet by 6 feet 8 inches, on the north side of the subway.

#### SECTION 4.

##### *Construction Data.*

Location and description of structures: Copley-square station and two-track subway of reinforced concrete and structural steel, from about 213 feet east of Exeter street, Sta. 46 + 30, to near the center of Arlington street, Sta. 69 + 00, a distance of 2270 feet.

Assistant Engineer in charge: Laurence B. Manley.

Contractor and date of contract: Hugh Nawn Contracting Company, December 26, 1912. (On February 27, 1913, the contract was extended, at the same unit prices, from about 85 feet east of Berkeley street, Sta. 63 + 51, to near the center of Arlington street, Sta. 69 + 00.)

Amount of bid plus amount of extension of contract: \$929,625.00.

Appendix showing bids in this report: W.

Date of completion named in contract: December 31, 1913.

Dates of beginning: Excavation, January 2, 1913; Concrete, January 20, 1913.

Amount of work done during year ending June 30, 1913: Excavation, 63,002 cu. yds.; Standard concrete placed, 14,000 cu. yds.; Structural steel placed, 95 tons; Steel rods used for reinforcing concrete, 981 tons

Number of men ordinarily employed by the contractor during year ending June 30, 1913: Day, 290; Night, 160.

Character of earth found in excavation: Gravel filling over a thick layer of silt. Below the silt the material varies, being peat in some places, and sand and gravel or blue clay in other places.

Disposition of surplus: By steam railroad to Metropolitan Park at Cottage Farm, Allston.

Contractor for furnishing structural steelwork and dates of contracts: Levering & Garrigues Company, November 21, 1912, and December 26, 1912.

Amounts of bids: \$5,223.00 and \$14,487.60.

Appendices showing bids in this report: O and V.

Dates of completion named in contracts: Four months from receipt of order and correct information by which to order material.

Dates of certificates of completion: March 10, 1913 and April 22, 1913

#### DIVERSION OF STREET CAR TRAFFIC.

In order to facilitate the construction of this section, the route of the surface cars of the Boston Elevated Railway Company was temporarily changed April 4, 1913, from Boylston street, between Exeter and Arlington streets, to the new tracks on the route approved by the Commission March 20th and laid by the Boston Elevated Railway Company in Exeter street from Boylston street to Huntington avenue, and in Huntington avenue, Copley square, St. James avenue and Arlington street, connecting again with the old tracks at Boylston street.

#### NEW LOCATION OF 42-INCH WATER PIPE.

The 42-inch water pipe crossing Boylston street from Huntington avenue into Clarendon street, which is the main high service supply for the down-town Boston district, was found to be so low as to interfere with the construction of the subway at this point. It is necessary to maintain service in the pipe at all times, and as its presence with a pressure of 100 lbs. per square inch, in the subway excavation was considered to be dangerous to the surrounding buildings in case of a possible break, a temporary by-pass was laid through Dartmouth and Newbury streets to carry the flow while the water pipe was being raised and the subway constructed at the Clarendon street crossing. The laying of the new pipe, which consists of 83 feet of 20-inch pipe, 510 feet of

24-inch pipe, and 485 feet of 36-inch pipe, was begun on March 4, 1913, and the water turned on through it at 1.00 P.M. March 18, 1913.

#### FOUNDATIONS.

The ground through which this section of the subway passes is similar to that encountered in other sections of this subway. At Dartmouth street there is about 17 feet of silt between the bottom of the subway structure and the hard clay. West of Dartmouth street the subway station is to be built on the earth without pile foundation. At other places the invert rests either on the hard blue clay or upon longitudinal concrete walls or piers built up from the clay.

#### CARE OF THE OLD SOUTH CHURCH TOWER.

As is quite generally known the tower of the Old South Church has a distinct inclination to the southwest. This condition has existed ever since the completion of the tower. An examination of the foundations show them to be inadequate for the support of a tower which weighs approximately 5,000 tons. There are no drawings available showing precisely the character of the foundations under the tower, but from test pits dug in the church basement it is ascertained that the foundation is of granite, spreading to 37 feet by  $42\frac{1}{2}$  feet at its bottom dimensions and is supported on piles spaced about  $2\frac{1}{2}$  feet on centers, which piles are cut off at grade  $3\frac{1}{2}$  feet above Boston base. The tops of the piles are slightly above the old marsh level. Below this level, and extending to a depth 34 feet below the sidewalk, is a layer of black silt composed of finely divided sand and clay colored with organic matter. This silt is impervious to water and is stiff enough to stand with vertical banks 10 feet high. Below the silt are pockets of sand and gravel overlying the clay. The clay extends from  $37\frac{1}{2}$  feet to 140 feet below the surface of the sidewalk. The upper part of the clay is hard for a depth of about 10 feet. Below this it is soft and extends in this condition to the bottom. It is not known whether the piles extend through the silt to the harder strata below. As a measure of protection the



subway excavation area between the westerly end of the station and the westerly side of Dartmouth street was enclosed within rows of interlocking steel sheet piling 35 feet long with upper ends driven to elevation 108 which is about 10 feet below the surface of the street. As a further protection 2-inch pipe borings, about 10 feet apart, were driven on the outside of the sheet piling, and neat cement grout was forced through the pipes into the earth, at a pressure of from 50 to 90 lbs. per square inch, to fill all the cavities caused by driving the sheet piling or otherwise and to make concrete out of the sand and gravel stratum.

#### ARTICLES OF ANTIQUARIAN INTEREST.

Interesting antiquarian relics have been unearthed in the Back Bay district of Boston during the construction of the Boylston-street Subway. On Boylston street between Dartmouth street and Clarendon street at a depth of 30 feet below the surface were found the remains of what appears to be a prehistoric fish weir, the parts found consisting of sharpened sticks about 4 feet long and two inches and less in diameter driven points downward about 18 inches into the blue clay, with traces of longitudinal wattling between the uprights. The tops of the sticks became covered with silt and it is supposed that their present depth marks the total subsidence of the land since they were set in place. Some of the sticks are birch, some pieces still retaining the bark. Others bear a rough brown bark similar to that on the trunk of a white pine. The sticks show unmistakable signs of being sharpened with some rough implement. Their upper portions were covered by the overlying stratum of silt, and were not so well preserved as the points. The wood, while keeping its shape, was very soft when found, and easily broken or scarred. Some of these sticks are now at the office of the Boston Transit Commission, and others have been taken to the Peabody Museum at Harvard University.

As before stated this ancient weir was found in the surface of the blue clay deposited by glacial action in the old Boston Basin. This stratum of clay is about 100 feet in thickness at this point and rests on boulders overlaying the bed rock. The top of the clay here is about 12 feet below mean low water.

Borings along the line of the subway indicate that the surface of the clay is at its lowest level at this point, the low channel extending north and south about on the line of Dartmouth street from this point to the Charles River. Above the glacial clay is a deposit about 20 feet in thickness of compacted silt, extending to the surface of the old Back Bay and containing layers of giant oyster shells. The largest of the shells found is 10 inches long and weighs  $2\frac{1}{4}$  lbs. The ground above this point was filled in with gravel in the year 1870 to something above its present grade.

The whole Back Bay district, extending across the Charles River into Cambridge, has shown a gradual settlement in addition to more marked local settlement due to the displacement of the silt. This settlement has been reliably estimated to be at the rate of 1 foot in 100 years. Assuming this rate of settlement to be fairly uniform an interesting estimate may be made of the age of the sticks found. The present elevation is about 12 feet below mean low water. The original elevation must have been about tide marsh level or about 8 feet above low water, making a total settlement of 20 feet. At the rate of 1 foot subsidence per 100 years, this 20-foot settlement would indicate that the sticks discovered were sharpened and set in place some 2000 years ago.

### EAST BOSTON TUNNEL EXTENSION.

The location as determined upon March 11, 1913, when it was decided to locate the westerly end of the open incline near North Russell street, makes the total length of the extension about 2,700 feet including the changes to be made in the grade of the East Boston Tunnel under the part of Court street between Washington street and Scollay square. This location is shown on the map, Plate 1. The westerly incline is to be between Chambers street and North Russell street, and between these two streets a land taking on the northerly side of Cambridge street about 46 feet in width has been made for street widening, to provide a roadway and sidewalk on each side of the incline. A triangular strip has also been taken on the westerly side of North Russell street for the same purpose. Bids have been called for, to be opened July 1, 1913, for tearing down the buildings on the land taking between Chambers street and North Russell street. Detailed plans are being pre-

pared for the construction of the incline and the two-track tunnel west of Staniford street. The detailed plans for the station in Scollay square are nearly finished.

## SECTION G.

### *Construction Data.*

Location and description of structures: Section G begins in Scollay square near the southerly side of Cornhill and extends to a point opposite Stoddard street under Court street. It is being constructed of reinforced concrete and structural steel.

Assistant Engineer in charge: Robert B. Farwell.

Contractor and date of contract: Isaac Blair & Company, Inc., December 2, 1912. (As the work could not well be estimated on in advance, it has been done under a contract in which the contractor is paid cost plus ten per cent, and insurance on laborers.)

Dates of beginning: Excavation, November 29, 1912; Concrete, December 21, 1912.

Amount of work done during year ending June 30, 1913: Excavation, 19,600 cu. yds.; Concrete 3,380 cu. yds.; Structural steel placed, 23 tons; Steel rods used for reinforcing concrete, 163 tons.

Number of men ordinarily employed by the contractor during year ending June 30, 1913: Day, 105; Night, 110.

Character of earth found in excavation: The ground in the vicinity of Scollay square, after a few feet of filling near the surface, consists of a mixture of sand, gravel and clay until about 30 feet below the surface, after which depth the blue clay is generally continuous.

Disposition of surplus: To the new site for the Massachusetts Institute of Technology in Cambridge.

Contractor for furnishing structural steelwork and dates of contracts: Bethlehem Steel Company, September 19, 1912 and December 12, 1912.

## CONSTRUCTION.

The first work was to construct about 70 feet of side wall and sewer at the northerly corner of Court and Hanover streets, and about 200 feet of side wall and sewer on the opposite side of Scollay square in Tremont row. The work required great care, as it was within a few feet of the buildings and over 40 feet in depth. About the end of January of this year the work of underpinning the buildings on the easterly side of Scollay square, where the walls of the tunnel practically touch the street line, was begun, and at this date the buildings 87-97 Court street have been underpinned and the easterly wall of the tunnel built, while the underpinning of the Crawford House is now in progress.



WASHINGTON STREET TUNNEL, SUMMER STATION. A PORTION OF THE SHOW WINDOWS IN BASEMENT OF FILENE BUILDING AND ONE OF THE EXITS INTO STORE AS SEEN FROM PLATFORM OF STATION.





Northwesterly from Howard street and extending to Stoddard street a portion of the tunnel lies under the buildings. Work under the buildings was started in April, 1913, portions of the easterly and center walls which were beneath the street having been built in February and March. The walls and piers of the buildings have been supported across the excavation on steel beams, and as fast as the structure of the tunnel has been completed these walls and piers have usually been underpinned with masonry built up from steel beams encased in concrete, on the tunnel roof, and reaching from the side wall to the center wall. This work has been proceeding as fast as the conditions would permit and is not yet completed.

Between Howard street and the wall of the Tremont-street Subway at the head of Hanover street a lobby about 10 feet in height is to be constructed over the tunnel roof, furnishing room for ticket offices for the Hanover street entrance, and space for storage purposes. This portion of the work has been partly done. A permanent pump-well has been built at the northerly end of the new tunnel platform.

Drifts have been dug under the present subway north of the present station and the heavy steel columns and girders which are to support the upper structure are being placed in position.

### WASHINGTON STREET TUNNEL.

The changes in the Summer station of the Washington-street Tunnel on account of the construction of the New Filene Building, with its show-windows and exits from the station into the building, were practically completed during the summer of 1912. These changes were described on pages 43 and 44 of the last Annual Report. Plate 11 shows a portion of the station near one of the exits.

### STOCK YARD AT SOUTH BOSTON.

At the Cypher-street stock yard in South Boston, a spur track accommodating five freight cars has been laid, thereby permitting materials to be delivered directly from the cars at the place for storage. An electrically operated 10-ton locomotive crane for handling the steel, etc., has been installed. Two sheds, each with a floor area of 1800 square feet, have

been built for the storage of cement, waterproofing materials, etc.; also a shed for storing, cutting and bending steel reinforcing rods. The area of this yard is about 64,000 square feet. About one-third of its area is required for the storage of steel beams, girders, columns, sewer pipe and other material, which are to be used for the tunnels and subways now under construction.

The chemical and physical laboratories of the Commission, where the cement and other materials to be used in subway construction are tested, are located at this yard.

### ENGINEERING FORCE.

The names of the assistants, with the nature of the work upon which each has been engaged, are given in Appendix K. I am indebted to all of the assistants for their co-operation and efficient service.

Respectfully submitted,

EDMUND S. DAVIS,  
*Chief Engineer.*

## APPENDIX A.

## BOYLSTON STREET SUBWAY TERMINAL.

BOSTON TRANSIT COMMISSION,  
15 BEACON STREET, BOSTON, May 9, 1913.

HON. LEVI H. GREENWOOD, *President*.

On April 18, 1913, the Honorable Senate passed the following order:

*Ordered*, That the Boston Transit Commission is hereby requested to report to the Senate within three weeks after the adoption of this order as to the probable cost of extending the so-called Boylston street subway through Boylston street to Washington street, and from Washington street by such route as the commission may deem desirable to Post Office square, providing for an exchange of traffic with the Tremont street subway at or near the corner of Tremont and Boylston streets, with the Washington street tunnel at or near the corner of Boylston street and Washington street and with the Dorchester tunnel at some point on Summer street; also as to the precise route to be followed in case such extension should be made and as to whether or not, in the opinion of the commission, taking into consideration the probable cost and all other matters, it is desirable to alter the route of the Boylston street subway, as defined in chapter 741 of the acts of 1911, by abandoning the construction of that part of the Boylston street subway between Boylston street and Park street and as a substitute therefor extending the subway to Post Office square.

In accordance with this request the Boston Transit Commission submits the following report:

## PRESENT ROUTE FOR THE BOYLSTON STREET SUBWAY.

As authorized by chapter 741 of the Acts of 1911 the Boylston street subway is to provide two tracks extending under Boylston street to the corner of Boylston and Tremont streets, turning at that point and following the route of the present subway along the Common to a terminus at Park street. There will be a station near the corner of Boylston and Tremont streets with provision for transfer to the tracks of the present subway running south to Pleasant street. The station at Park street is to be greatly enlarged and the two tracks of the Boylston street subway will be connected by a loop similar to the loop for the present tracks at that point.

The precise details for this portion of the line had not been determined by the Commission when the said order was passed. Numerous studies had been made, with estimates of cost; many consultations had been held with the officers of the Boston Elevated Railway Company and the various plans had been compared with reference to economy and convenience.

No definite statement, therefore, can be made at this time as to just what the arrangement of these tracks will be, even if there is no further legislation. It is possible that the station at the corner of Boylston and Tremont streets will contain platforms at different levels, so that passengers transferring at that point may have to go up or down stairs to reach the car which they desire to take. The same is true of the station at Park street. It is also possible that the station at Park street may have all the platforms on the same level as those of the present subway, in

which case the transfer from one platform to another may require going downstairs and up again. It has, however, been considered a valuable feature in operation, which would promote the convenience of passengers, to provide that persons coming by any route from the south or west should be able, by taking the proper car, not only to reach Park street but to proceed beyond Park street to Scollay square, Haymarket square and the North station without transfer; in other words, some of the cars running in the new Boylston street subway might be looped back at Park street, while others might continue to Scollay square and beyond on the present tracks between Park street and Scollay square. The same arrangement may be made with reference to surface cars entering the present Tremont street subway, some of which may be looped back at Park street as at present, while others may continue to the north. In a similar manner cars from Pleasant street, all of which now run through to the north, may in the case of some lines be looped back at Park street instead of continuing beyond that point.

To effect these features of operation, cross-overs between the various tracks will have to be provided, and, as already stated, no definite decision has been reached as to the arrangement of tracks for this purpose.

In any case, however, the route at present authorized will provide for a transfer at the corner of Boylston and Tremont streets connecting with the present cars to and from Pleasant street, and at Park street there will be provision for continuing farther to the north, if desired, either by transferring or by continuing in certain cars without transfer and there will also be opportunity at Park street, by going downstairs, to transfer to the Cambridge tunnel and the Dorchester tunnel, thus connecting with Cambridge and other points on the west and with Summer street, the South station, South Boston and Andrew square on the east. Passengers taking the Dorchester tunnel in this manner may transfer at Washington street to the Washington street tunnel and thus reach Dudley street and intermediate stations on the south and Sullivan square and intermediate stations on the north. By transferring again at State station it will be possible to reach the surface at the corner of Water and Devonshire streets; or by transferring at the same station to the East Boston tunnel connection may be made with the Atlantic avenue elevated line.

The route as authorized, therefore, will enable passengers by the Boylston street subway to reach practically all parts of the city and to reach the Post Office by making two transfers.

#### SUGGESTED ROUTE FOR THE BOYLSTON STREET SUBWAY.

The route contemplated in the order requires that the two tracks of the new Boylston street subway instead of turning north at the corner of Boylston and Tremont streets, shall continue under Boylston and Essex streets, passing under the Tremont street subway, and also under the Washington street tunnel, with connections with both of these routes. From Essex street the subway might continue either under Chauncy, Arch and Milk streets, or under Kingston and Otis streets to Post Office square; in either case terminating with a loop encircling the Post Office, having a station either in Post Office square or in Devonshire street, or in both places. At the point where this route crosses Summer street there would be a station having a connection with the Dorchester tunnel.

These two routes between the corner of Boylston and Tremont streets and Post Office square have been studied by the Commission. They are referred to in the report of the Chief Engineer and one of them is shown in the accompanying map. The route by way of Chauncy and Arch streets requiring the proposed subway to cross the Dorchester tunnel at the easterly end of the Summer street station, brings the roof of the subway within a foot and a half of the surface of the street, and leaves no room for pipes or conduits of any character over the entire width of Summer street. The total cost of this route is also greater than that of the other, which extends by way of Essex, Kingston and Otis streets to Post Office

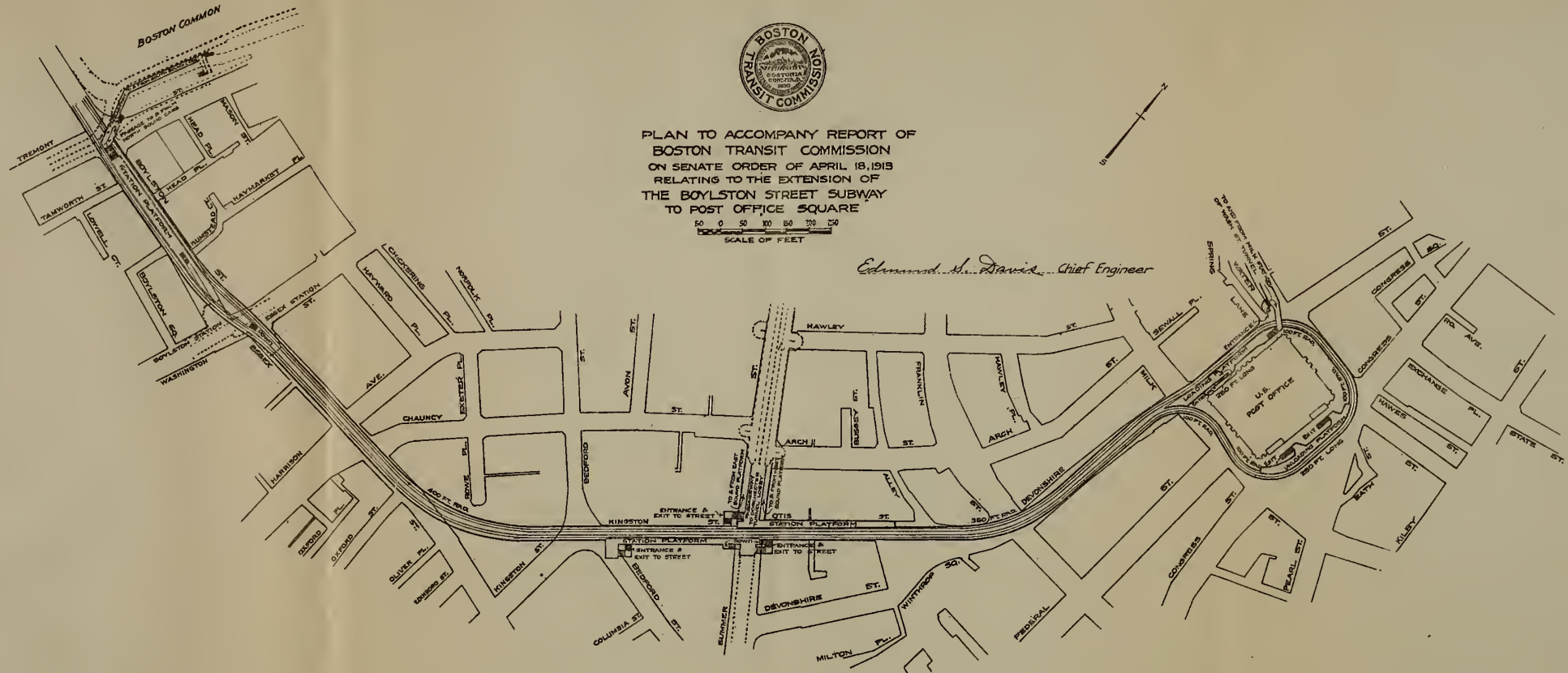




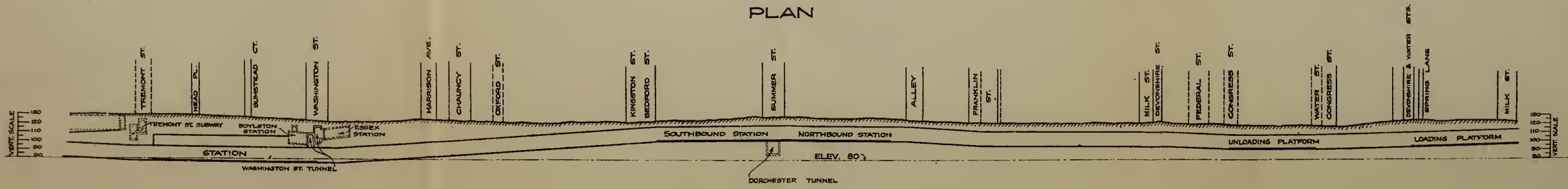
PLAN TO ACCOMPANY REPORT OF  
BOSTON TRANSIT COMMISSION  
ON SENATE ORDER OF APRIL 18, 1913  
RELATING TO THE EXTENSION OF  
THE BOYLSTON STREET SUBWAY  
TO POST OFFICE SQUARE

50 0 50 100 150 200 250  
SCALE OF FEET

*Edmund M. Davis*, Chief Engineer



PLAN



PROFILE





square. The latter route has also the advantage in point of alignment, avoiding several objectionable curves and is therefore the route preferred by the Commission if the terminal is to be located at Post Office square.

Other routes from Essex street to Post Office square may also be worthy of study, even though longer and involving more construction. A loop should be constructed in some manner at the terminal; in the plan submitted this loop is shown encircling the Post Office, but there are other possible locations for such loop, which should be further studied.

If a Post Office square route should be adopted it would be desirable and practicable to provide that while cars coming from the west might proceed to Post Office square by one of the routes indicated above, other cars might cross over to the present subway tracks under the Common and proceed to Park street and beyond.

It is evident from this explanation that either the authorized or the suggested route would enable passengers to reach the same points in the city, the only modification of this statement being that the Park street route, as above explained, would enable passengers to reach the street surface at the corner of Water and Devonshire streets or one block away from Post Office square, while the proposed route would enable passengers to reach Post Office square itself. Since both the authorized and the suggested routes would reach the same points it is only a question of the transfers necessary, and in this respect the following categorical statement may be of interest.

#### 1. *To Reach Park Street.*

By the authorized route all passengers could reach Park street without change.

By the proposed route passengers in certain cars could reach Park street without change, while passengers in other cars would have to transfer at the corner of Boylston and Tremont streets.

#### 2. *To Reach Scollay Square.*

By the authorized route all passengers could reach Scollay square, those in certain cars without change at Park street and those in other cars by transferring at Park street.

By the proposed route some passengers could reach Park street without change; others by making one transfer either at Park street or Boylston street.

#### 3. *To Reach Haymarket Square.*

By the authorized route some passengers could reach Haymarket square without change, others by making one transfer at Park street.

By the proposed route some passengers could reach Haymarket square without transfer; others by making one transfer at Park street or Boylston street, or by transferring to the Washington street tunnel at Boylston street.

#### 4. *To Reach the North Station and Beyond.*

By the authorized route passengers could reach these points either without change or by making one change at Park street.

By the proposed route some passengers could reach these points without change, others would have to change at either Park or Boylston streets to the Tremont street subway, or at Boylston and Washington streets to the Washington street tunnel.

#### 5. *To Reach Pleasant Street.*

Passengers by either route could reach this point by transferring at the corner of Boylston and Tremont streets.

6. *To Reach the Corner of Summer and Washington Streets or Summer and Chauncy Streets.*

By the authorized route all passengers would have to transfer at Park street.

By the proposed route passengers who take the proper cars could reach these points without transfer.

7. *To Reach the Post Office.*

By the authorized route passengers would have to transfer at Park street to the Dorchester tunnel, at Summer street to the Washington street tunnel, leaving the train at State station and walking through the subpassage to the corner of Water and Devonshire streets; or they could transfer at Scollay square, if in through cars to the north, or at Park street and at Scollay square, if not in through cars to the north, taking the East Boston tunnel to the corner of Devonshire and State streets one block away from Post Office square.

By the proposed route passengers in the proper cars could reach Post Office square without transfer.

With reference to this schedule it is to be observed that if the subway were constructed on the proposed route a large number of the cars from the west would continue to Post Office square, so that it would probably be necessary for many of the passengers who wish to reach Park street or Scollay square to transfer at the corner of Boylston and Tremont streets. In other words, by the proposed route a large number of passengers wishing to reach Park street would have to transfer, while by the authorized route all would reach Park street without transfer.

ADVANTAGES AND DISADVANTAGES OF PARK STREET AS A TERMINAL.

Park street cannot be said to be a terminal from which traffic distributes in all directions. To the west of the station lies the Common. The destination of most inbound passengers lies to the north and east of the terminal point. Post Office square, on the other hand, is a centrally located terminal, the distribution of passengers from this point being in all directions. On the other hand Park street terminal offers good facilities, so far as space is concerned, both underground and on the surface. The underground platforms can be made large and commodious and the presence of the Common above makes the congestion on the surface much less than would occur in any of our city streets or squares. Post Office square is not so favorable in this respect. There is not so much room underground and the surface is already congested at some hours of the day. We have therefore on the one hand a terminal which affords ample space both below ground and on the surface but does not distribute in all directions and on the other hand a terminal with less available space both below ground and on the surface but which does distribute in all directions.

The Commission is of the opinion that stations and terminals on rapid Transit lines should, if possible, be so located as to distribute rather than to concentrate traffic. The aim should be to facilitate the extension of the business district rather than its contraction. The route to Park street tends to concentrate traffic at that point, while the route to Post Office square would tend to distribute it.

From these points of view Post Office square as a terminal appears superior to Park street, while the latter has the advantage with reference to available space. When we consider further the facilities that the terminal at Park street will offer for transfer to various lines which reach all parts of the city the relative advantages of Post Office square are diminished in importance.

## COST.

Appended is the report of the Chief Engineer of the Commission, Mr. Edmund S. Davis, from which it appears that the cost of the authorized route to Park street between the corner of Boylston and Tremont streets and the terminal would be \$2,150,000, while the cost of what appears the most favorable route to Post Office square between the corner of Boylston and Tremont streets and the terminal would be \$3,800,000. The route to Post Office square, therefore, involves an additional expenditure of about \$1,650,000. In other words, reckoning simply from the corner of Boylston and Tremont streets, the route to Post Office square costs about double the route to Park street and is nearly twice as long. The length of the entire subway if the terminus is at Park street is 10,300 feet, and if the terminus is at Post Office square is 12,000 feet.

The rental paid by the Boston Elevated Railway Company for the use of the subways is  $4\frac{1}{2}$  per cent. of their cost. The increased cost, therefore, of the route to Post Office square would involve an increased rental to the company of \$74,250 per annum. If we admit that Post Office square has certain advantages as a terminal over Park street, and that a route to the former point offers some additional conveniences in reaching certain stations, the question is whether these advantages are worth the cost. Furthermore, if the route to Post Office square is adopted there would probably be a delay of about a year and a half in the time of opening the entire subway. With the increasing congestion of Boylston street and the need for greater facilities such a delay in the opening of the subway is a serious consideration.

## COUNT OF TRAFFIC.

In order to aid the Commission in arriving at a decision in regard to the questions submitted to it arrangements were made with the Boston Elevated Railway Company to have a vote taken showing the preference as to the two terminals of passengers who use the following cars which will run in the new Boylston street subway:

Brookline-Newton line via Ipswich street.  
 Allston station via Beacon street.  
 Oak square station via Commonwealth avenue.  
 Watertown station via Nonantum and Oak squares and Commonwealth avenue.  
 Newton line via Commonwealth avenue.  
 Newton line via Beacon street.  
 Reservoir via Beacon street.  
 Watertown station via North Beacon street.  
 Harvard square via Broadway and Cottage Farms.

Counts were made on Thursday, May 1, Saturday, May 3, and Monday, May 5. For several days previous to these dates notices were hung in these cars explaining the relative routes and what would be accomplished by each, and on the days mentioned ballots were distributed by conductors and collected in the subway, giving each passenger an opportunity to express his preference for either terminal.

The result of this balloting has been that a majority of the passengers voting have expressed themselves in favor of the terminus at Post Office square, the exact figures being as follows:

	In favor of Park Street.	In favor of Post Office Square.	Blanks.
Thursday, May 1, . . . . .	10,845	10,410	600
Saturday, May 3, . . . . .	11,400	14,025	1,096
Monday, May 5, . . . . .	9,236	13,413	677
	31,481	37,848	2,373



## CONCLUSION.

In view of the fact that no change can be made in existing legislation without the consent of the Boston Elevated Railway Company as lessee, and in view also of the desirability of obtaining the opinion of the lessee upon operating and other questions involved in the proposed change of route, the Commission has conferred with officials of the railway company in order to obtain their views and suggestions. The Commission is informed by the Company that it is unable to arrive at any definite conclusion within the short time allowed for the making of this report, but that it considers that there is sufficient ground for reopening the question of the best location for the terminal of the Boylston street subway.

The Commission suggests that the law should be amended so as to allow the connecting of the Boylston street subway with the Tremont street subway at some suitable point, which would be between Charles and Tremont streets, without constructing two additional tracks beyond this junction point at the present time, such connection to be regarded as a temporary one, for use until the question of the best location of the terminal can be finally determined. This suggestion has received the approval of the lessee company.

Such a connection between the tracks of the Boylston street subway and the present tracks of the Tremont street subway could be made in much shorter time than would be required to complete the Boylston street subway with two additional tracks to Park street or to any other terminal. The congestion caused by the delay of surface cars on Boylston street could thus be relieved at a comparatively early date, probably during the summer of 1914; passengers from the west could thus sooner enjoy the advantages of underground transportation from the entrance of the Boylston street subway at Kenmore street to the Park street station and beyond. The carrying out of this plan would not necessarily increase the number of cars and passengers now utilizing the Park street terminal, and the relief from congestion on Boylston street would in some degree facilitate the movement of traffic at Park street by making it more regular.

The further benefit to passengers by the Boylston street subway resulting from the provision of two additional tracks to Park street, or to such other terminal as may be substituted therefor, would by this plan be postponed; but it seems to the Commission that such postponement would be more than made up for, first, by securing the advantages of an earlier connection of the Boylston street subway over the tracks of the Tremont street subway with Park street and points beyond; and, second, by affording an opportunity for more thorough study before the question of changing the location of the terminal is finally decided.

In view of the fact that both the Commission and the Boston Elevated Railway Company as lessee are agreed in the opinion that it may be found desirable to change the terminal from Park street, as now authorized by law, to Post Office square, it would certainly seem proper that this question should be held open for further study, particularly in view of the fact that this can be done not only without postponing the enjoyment by passengers of the quicker transit which the Boylston street subway is designed to secure but with a realization of this quicker transit at a considerably earlier date than would otherwise be possible.

In order to carry out this suggestion it would be necessary to secure such modification of the lease of the Boylston street subway already executed as would provide for the use of the above-named portion of this subway and the payment of rental therefor as soon as it is connected with the tracks of the Tremont street subway. But such temporary arrangement should not change the right of the Commission to construct two additional tracks from the proposed junction of the two subways to the Park street terminal, nor relieve the lessee of any of its existing obligations, unless some other terminal is substituted, with the assent of the lessee by subsequent legislation.



Further, there is an alteration in the present route which the Commission deems should be authorized to be carried out if on further investigation found to be desirable. The new and the old subways in Boylston street easterly of Park square will run on parallel lines and there will thus be there two subway tracks for inbound and two tracks for outbound cars. If the two tracks for inbound cars are put on one side of the central line and the two tracks for outbound cars on the other, then each set, if constructed at the same level, can be connected by cross-overs so that a car passing on either line can cross over to the other and after reaching Park street either continue to the north or loop at that point, going no farther. This will conduce to flexibility and convenience of operation. In order to effect this arrangement of tracks under the present law it would be necessary to carry the outbound new subway track to the north of the present subway incline in the Public Garden. If however, authority is given to the Commission to move the present incline to the south, thus taking it out of the Public Garden and throwing a corresponding piece of the Garden into the street, the alignment of both subways would be improved, the accommodations for street traffic would be enlarged, and an arrangement of cross-overs could be more advantageously and simply carried out. The street traffic outbound from Park square would then pass to the north of this incline, while at the present time this traffic has to cross at grade the street railway tracks where they emerge on to Boylston street from the Public Garden. To carry out this suggestion it will be necessary to authorize the widening of Boylston street on its north side from Park square to near Arlington street, for this purpose taking a strip of the Public Garden varying in width from approximately 28 feet at the corner of Charles street to nothing at the corner of Arlington street. To offset this the present incline in the Public Garden would be abandoned and filled up.

The effect of this change, therefore, would be to take an area of about 16,000 square feet from the Public Garden, making this area a part of Boylston street, and to restore to the Public Garden an area of about 14,900 square feet now used for the incline. The width of the traveled way and of the sidewalk in Boylston street would be about the same as at present, but, on account of the more favorable location of the incline, the convenience and safety of the street and its capacity for vehicle traffic would be increased.

It is therefore recommended; first, that legislation be passed authorizing the removal of the incline of the Tremont street subway from the Public Garden to the middle of Boylston street widened at this point; second, that the Commission be authorized, if assented to by the company, to postpone for such period as may be deemed proper, the construction of the two additional tracks of the Boylston street subway from Boylston street to the Park street terminal; third, that the making of the above mentioned connections to secure the use of a portion of the Boylston street subway before the whole is completed be authorized, if assented to by the company.

Such postponement would afford opportunity for the Legislature to pass finally upon the suggested change of the terminal from Park street to Post Office square, with the full information which is not now available, and with knowledge of the attitude of the lessee company.

The above report is unanimously submitted.

GEORGE G. CROCKER,  
GEORGE F. SWAIN,  
HORACE G. ALLEN,  
JOSIAH QUINCY,  
JAMES B. NOYES,

*Boston Transit Commission.*

BOSTON TRANSIT COMMISSION,  
15 BEACON STREET, BOSTON, May 2, 1913.

COPY.

MESSRS. GEORGE G. CROCKER, GEORGE F. SWAIN, HORACE G. ALLEN,  
JOSIAH QUINCY, JAMES B. NOYES, *Boston Transit Commission.*

GENTLEMEN:—In compliance with your request that I should make studies and estimates in regard to changing the route of the Boylston street subway so that instead of terminating at Park street it shall continue under Boylston street to Washington street and thence through various streets and under private land to Post Office square, I beg leave to submit plans and profiles with approximate estimate of cost for a route beginning at the westerly side of Tremont street, thence via Boylston and Essex streets, private land, Kingston, Otis, Devonshire and Milk streets to Post Office square, making a loop around the Federal building, with a station between Tremont and Washington streets, having provisions for transferring to and from the Tremont street subway and the Washington street tunnel, a station in Kingston and Otis streets, having provisions for transferring in Summer street to and from the Dorchester tunnel and stations in Post Office square and Devonshire street.

The length of the route as authorized by the Legislature for the Boylston street subway from Kenmore street to Park street is about 10,300 feet. If the route should be changed by abandoning the construction of the part between Boylston street and Park street, about 1,720 feet, and the route to Post Office square, about 3,420 feet, substituted, it would increase the length of the Boylston street subway about 1,700 feet, making its total length about 12,000 feet.

Cost of suggested route from intersection of Boylston and Tremont streets to Post Office square, including land damages,	\$3,730,000
Additional cost of construction between Charles and Tremont streets necessitated by said route,	70,000
Total,	\$3,800,000
Cost of portion already authorized from intersection of Boylston and Tremont streets to Park street with provision for sending cars from all lines south of Park street through to the North station,	2,150,000
Excess of cost of suggested route to Post Office square,	\$1,650,000

If the route to Post Office square should be adopted it is estimated that it would require a year and a half longer to complete the Boylston street subway to that point than to complete it to Park street.

Another route which had been suggested instead of the Kingston and Otis streets route was through Chauncy, Arch and Milk streets. Studies were made for this route and it was found that the roof would be only about 1.5 feet below the surface of the street in that portion of Chauncy and Arch streets between Bedford and Franklin streets, on account of having to cross over the Dorchester Tunnel at Summer street. As the subway structure would take up the full width of Chauncy and Arch streets no available space would be left for sewers, water and gas pipes, or for electric conduits, etc. The alignment of the route would also be objectionable, as there would be a reversed curve of 180 feet radius at Summer street, a curve of 75 feet radius at the corner of Arch and Milk streets, a like curve at the corner of Devonshire and Water streets and also at the corner of Devonshire and Milk streets. For these reasons further consideration of the route by way of Chauncy and Arch streets seems unnecessary.

Respectfully submitted,

(Signed) EDMUND S. DAVIS,  
*Chief Engineer.*

## APPENDIX B.

## [CHAPTER 810.]

## AN ACT RELATIVE TO THE BOYLSTON STREET SUBWAY.

*Be it enacted, etc., as follows:*

SECTION 1. The Boston transit commission, hereinafter called the commission, is hereby authorized and directed to investigate and report to the next general court whether or not, in view of the traffic to be served and the additional expense involved, it is desirable to alter the route of the Boylston street subway, as defined in chapter seven hundred and forty-one of the acts of the year nineteen hundred and eleven, by abandoning the construction of that part of the Boylston street subway between Boylston street and Park street, in the city of Boston, and in place thereof extending said subway through Boylston street to Washington street, and from Washington street by some route to Post Office square, providing for an exchange of traffic with the Tremont street subway at or near the corner of Tremont and Boylston streets, with the Washington street tunnel at or near the corner of Boylston street and Washington street, and with the Dorchester tunnel at some convenient point. In case the commission is of the opinion that it is desirable to alter the route of the Boylston street subway, it is requested to state in its report the precise route which it would recommend and the additional expense involved, and to submit with its report a draft of a bill embodying such legislation as may be necessary to carry out its recommendations. The cost of the above investigation and report shall be deemed a part of the cost of the Boylston street subway.

SECTION 2. Until the report required by the preceding section shall have been made and acted upon by the general court the Boston transit commission shall suspend the construction of that part of the Boylston street subway between Boylston street and Park street, and also so much of the Boylston street subway westward of Tremont street as might, in the judgment of the commission, be affected if the route of the subway should be altered as provided in section one. The commission shall proceed with the construction of the remainder of the Boylston street subway and shall connect it with the present Tremont street subway at such point in the vicinity of Park square as, in the judgment of the commission, may be convenient for that purpose; and upon its completion and connection, and after a reasonable time for equipment, the said part of the Boylston street subway shall be opened for operation without waiting for the construction of the remainder; and so much of the rental payable by the Boston Elevated Railway Company under its contract, dated December 7, 1911, as represents four and one half per cent of the net cost of that part of the Boylston street subway which has been completed, shall begin to accrue as soon as the use of that part of the Boylston street subway begins.

SECTION 3. The commission may construct in Boylston street between Arlington street and Charles street a new incline and approach to the Tremont street subway to take the place of the present incline and approach in the Public Garden, and may connect such incline and approach with the present Tremont street subway at such point in the vicinity of Park square as it may deem expedient. Upon the construction of such new incline, the present incline and approach in the Public Garden

shall be abandoned, and the excavation therein shall be filled up and the new incline and approach shall be deemed to be to all intents and purposes a part of the Tremont street subway. In order to provide for traffic in Boylston street, the commission is authorized to widen Boylston street between Arlington street and Charles street by taking, as a part of the street, so much of the land occupied by the Public Garden as lies between the present southerly fence of said garden and a line beginning at the intersection of the easterly line of Arlington street with the northerly line of Boylston street, thence running to a point opposite the westerly line of Church street and distant not exceeding forty feet from the line of the present southerly fence of said garden, thence continuing to Charles street at a distance not exceeding forty feet from said fence. The commission, if it decides to widen Boylston street as aforesaid, shall construct the street as widened; and the cost of the new incline and the cost of widening Boylston street, but not including any payment for that part of the Public Garden which is taken for that purpose, and the cost of filling the excavation of the present incline in the Public Garden shall all be deemed a part of the cost of the Boylston street subway. The commission shall have authority to relocate the surface car tracks in Boylston street and Charles street and to grant new locations for the same so far as, in its judgment, may be desirable in view of the changes which may be made in the incline and approach to the Tremont street subway and in Boylston street itself: *provided, however*, that if the new incline herein provided for shall be discontinued at any future time the land so taken from the Public Garden for the widening of Boylston street shall revert back to its present use as a part of the Public Garden, and the now existing street line of Boylston street shall be re-established.

SECTION 4. The commission, acting on behalf of the city of Boston, and the Boston Elevated Railway Company are authorized to make such modifications in the contract for the use of the Boylston street subway, dated December 7, 1911, as may be rendered necessary by the provisions of this act; but neither this act nor its acceptance, as hereinafter provided, shall be held to require any permanent change in the route of the Boylston street subway, as defined by chapter seven hundred and forty-one of the acts of the year nineteen hundred and eleven, or to require the city of Boston or the Boston Elevated Railway Company to consent to any such change.

SECTION 5. This act shall not take effect unless it is accepted by vote of the city council of the city of Boston, approved by the mayor, and accepted by the Boston Elevated Railway Company by vote of its board of directors, and certificates of such acceptances have been filed with the secretary of the commonwealth within sixty days after the approval of this act by the governor; nor unless the West End Street Railway Company by vote of its board of directors shall accept so much of this act as affects the Tremont street subway, and a certificate of such acceptance shall have been filed with the secretary of the commonwealth within the period of sixty days above specified. [*Approved June 16, 1913.*]



## APPENDIX C.

REPORT OF THE BOSTON TRANSIT COMMISSION ON THE  
DORCHESTER TUNNEL.

BOSTON TRANSIT COMMISSION,  
15 BEACON STREET, BOSTON, Jan. 4, 1913.

*To the Honorable Senate and House of Representatives.*

Chapter 27 of the Resolves of 1912 reads as follows:—

RESOLVE TO PROVIDE FOR A REPORT BY THE BOSTON TRANSIT COMMISSION OF A ROUTE FOR AN EXTENSION OF THE DORCHESTER TUNNEL IN THE CITY OF BOSTON.

*Resolved*, That the Boston Transit Commission is hereby authorized and directed, after an appropriation sufficient to cover the expense of the same as estimated by it has been made by the City of Boston, to give public hearings, and to investigate and report to the next general court, on or before the first Saturday in January, a route for an extension of the Dorchester tunnel provided for by chapter seven hundred and forty-one of the acts of the year nineteen hundred and eleven; said tunnel to start at Andrew square and form a continuation of said Dorchester tunnel and to run to such point in the Dorchester district, not nearer the terminus provided in said chapter for said Dorchester tunnel than Codman square in the Dorchester district, as will most conveniently afford access or approach for cars from Neponset, Field's Corner, Milton Lower Mills and Mattapan, so called, in said district. The commission shall embody in its report an estimate of the cost of constructing the said tunnel. [*Approved March 18, 1912.*]

In accordance with the foregoing resolve the Boston Transit Commission begs leave to submit the following report:—

As required by the resolve, the commission made an estimate of the expense of the investigation called for and notified the authorities of the city of Boston thereof. On December 17 the commission received notice that the appropriation had been made by the city council.

On December 20 advertisements were published giving notice of a public hearing, which was held at the rooms of the commission on December 26.

For information with reference to growth of population, counts of traffic, including pedestrians, and passengers in cars on the various street railway lines, the commission refers to its report to the Senate and House of Representatives under Chapter 97, Resolves of 1910, published in the seventeenth annual report of the commission (pages 52-77), a copy of which is transmitted herewith.

The resolve requires the commission to report "a route for an extension of the Dorchester tunnel," now under construction. This extension is to start at the terminus already fixed for the latter at Andrew square, and to form a continuation of the same to such point in the Dorchester district "not nearer the terminus provided in said chapter (chapter 741, Acts of 1911) for said Dorchester tunnel than Codman square . . . as will most conveniently afford access or approach for cars from Neponset, Field's Corner, Milton Lower Mills and Mattapan."



The commission has therefore to report a route for a tunnel from Andrew square to some terminus not nearer that square than Codman square, this terminus to afford convenient traffic facilities for cars from the four points above named.

It does not appear to the commission, however, that the intent of the resolve was that the *terminus* should be easily accessible from the four points mentioned, but that the terminus and route should be such that cars from these four points could easily make connections with the line. A new tunnel, if built, would be operated presumably by train service, so that surface cars would in no case enter it.

The witnesses at the public hearing given by the commission showed a consensus of opinion in favor of Codman square as the terminus. This terminus affords convenient access for cars from Milton Lower Mills, by way of Dorchester and Talbot avenues, and by way of Dorchester avenue, Codman and Washington streets. From Mattapan it affords convenient approach for cars by way of Blue Hill and Talbot avenues; and, at some time in the future, when the present car line located in Norfolk street shall have been extended to Mattapan, a still more direct approach will be supplied.

Codman square as a terminus is not itself conveniently reached from Neponset, but any subway extending from this terminus to Andrew square would be intersected by the car lines from Neponset along Neponset avenue, Gibson street and Geneva avenue to Bowdoin street.

Field's Corner is nearer to Andrew square than the terminus, and is on the direct line from Neponset, just described.

It appears, therefore, that a subway from Andrew square to Codman square would afford convenient access, either at the terminus or at some intermediate point, for cars from the four points named in the act.

After studying the question, and in view of the opinion of residents of the district, and the further fact that this point is at present almost the center of population of the district, the commission is agreed that the terminus referred to in the act should be at Codman square.

The next element to be considered is the location of the route from Andrew square to Codman square.

Studies of traffic and topographical conditions narrow the choice of routes to two:—

First, a direct route from Andrew square out Dorchester avenue to Centre street, and along Centre street to Codman square.

Second, by way of Boston street and Columbia road to Upham's Corner, thence following Columbia road, Hancock street and Bowdoin street to its intersection with Geneva avenue (or cutting across private property between these two points), then by way of Bowdoin street and Washington street to Codman square, possibly passing under private property at some points to shorten the distance.

In studying the advantages and disadvantages of these two routes attention must be paid to existing facilities for reaching the heart of the city. At the present time there are practically four available lines. Two of these are steam railroad lines and two are surface and elevated street railway lines.

Along the westerly edge of the Dorchester district lies Blue Hill avenue, in which the surface cars run in a reservation, and at rapid speed, from Mattapan to Grove Hall. Passengers from these lines may reach the elevated railway at Eggleston square by way of Seaver street and Columbus avenue, or at Dudley street by way of Warren street or Blue Hill avenue and Dudley street, and so reach the center of the city through the Washington street tunnel.

A short distance east of Blue Hill avenue is located the Midland division of the New York, New Haven & Hartford Railroad, carrying passengers to the South Terminal, with frequent stations in the Dorchester district and a 5-cent fare as far as Dorchester station.

Still further east is the direct street car line through Dorchester avenue with its various tributary lines, carrying passengers through South Boston, passing the South station, to the heart of the city. Many of the Dorchester avenue lines diverge at one point or another and carry passengers to the Dudley street station of the elevated.

A short distance east of Dorchester avenue lies the Plymouth division of the New York, New Haven & Hartford Railroad, the Shawmut branch of which extends from Harrison square to Milton Lower Mills (and thence through Milton to Mattapan), intersecting Dorchester avenue at several points, with frequent stations and a 5-cent fare to Ashmont on the Shawmut branch, and to Neponset on the main line.

East of the main line of the railroad there is a comparatively small population, residing along the shores of Dorchester Bay.

No point in the Dorchester district appears at the present time to be more than 3,300 feet in a straight line from the nearest steam railroad line, and the New York, New Haven & Hartford Railroad Company maintains seventeen stations in this district.

Consideration of the foregoing and an examination of the map submitted herewith shows that the Dorchester avenue route between Andrew and Codman squares lies quite close to the lines of the Plymouth division of the New York, New Haven & Hartford Railroad, and is crossed by them at several points. In the three miles followed by this route there are five railroad stations,—Crescent avenue, Savin Hill, Harrison square, Field's Corner and Shawmut.

The other route which has been described, via Upham's Corner, is much more nearly midway between the Plymouth and Midland divisions. It is also nearly midway between the Midland division and the Dorchester avenue street car lines. From the point of view of providing most conveniently for traffic to all sections of the district, therefore, it would appear that the latter route would best fulfil this object, and if a new rapid transit subway line were to be located between the termini referred to, this would be the best route rather than one along Dorchester avenue, which would practically parallel the Plymouth division, and would be located only a short distance from it. Of course it is to be borne in mind that the facilities afforded by a rapid transit street car line are not quite the same as those furnished by a steam railroad line. The latter carries passengers only to a terminal station, and they must then either walk or take a street car to reach the heart of the city, while the subway line carries them either direct or by transfer to all parts of the city. There is, therefore, a logical reason for not placing rapid transit street car lines precisely midway between the steam lines, and for considering the street railway system somewhat by itself. From this point of view there is more in favor of the Dorchester avenue route; but, nevertheless, it is unquestionable that this avenue lies a short distance from the waterfront, and that to the east of it, along the greater part of the proposed subway route, there is a comparatively small population which cannot much increase, while the Upham's Corner route would pass more nearly through the center of the district which would naturally be tributary to it.

The commission has had studies and estimates of cost made for the route via Dorchester avenue and for the route via Upham's Corner, the latter extending under private property under Meeting House Hill from near Glendale street to near the junction of Bowdoin street and Geneva avenue, and also extending under private property for some distance west of this point, to near the junction of School street and Washington street.

These two routes, together with street car routes, are shown on the map.

A subway under Dorchester avenue would lie comparatively near the surface, and would encounter but little rock, but it would be throughout its entire length subject to the difficulty of maintaining during construction the dense street traffic overhead, consisting of street cars and heavy vehicles.

The other route would be less exposed to difficulties of this kind, and, where it passes under private property, it would be at a considerable depth

below the surface, and would be a tunnel in rock. The greater amount of rock excavation on this route would be partly compensated by the greater expense on the other route of supporting the street traffic.

It appears from the report of our chief engineer, which is submitted as an appendix to this report, that the cost of construction of the Dorchester avenue line (Route No. 1)—with stations near Savin Hill avenue, near Field's Corner and in Codman square—would be, roughly \$6,100,000, exclusive of land damages, while the cost of construction of the Upham's Corner line (Route No. 2), which is slightly shorter than Route No. 1, would be, roughly, \$6,300,000, exclusive of land damages.

Generally speaking, then, the cost of a subway by either route would be approximately the same, or the difference would not be decisive in the face of other advantages.

After considering the matter as carefully as the time has allowed, therefore, the commission has reached the conclusion that the most favorable route for a tunnel between Andrew square and Codman square would be that designated above as Route No. 2, via Upham's Corner.

While this is the conclusion of the commission at the present time, it should be borne in mind that conditions are constantly changing, and that in the future another conclusion might be reached. Changes in steam railroad service, as well as in the street car service, and many other conditions are all factors affecting this problem.

Appended is the report of the chief engineer of the commission, Mr. Edmund S. Davis, with a general map of the district showing the two routes and the street car lines, and maps and profiles of each of the two routes.

BOSTON TRANSIT COMMISSION,

By GEORGE G. CROCKER,

*Chairman.*

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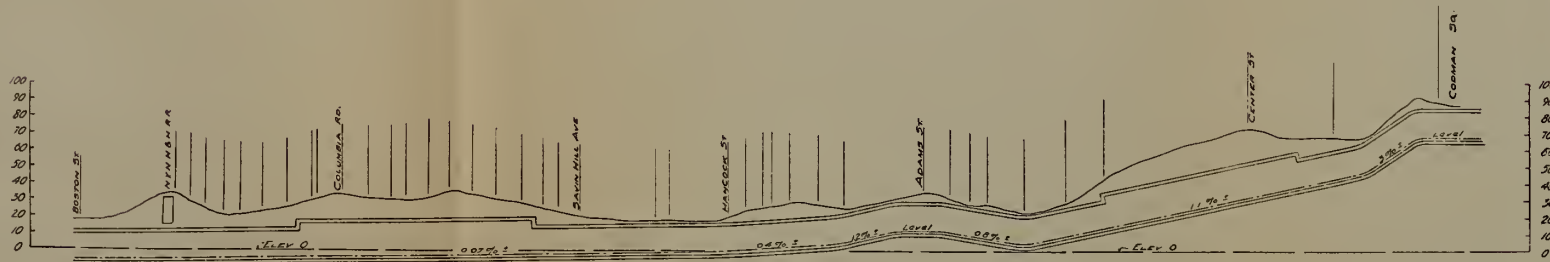
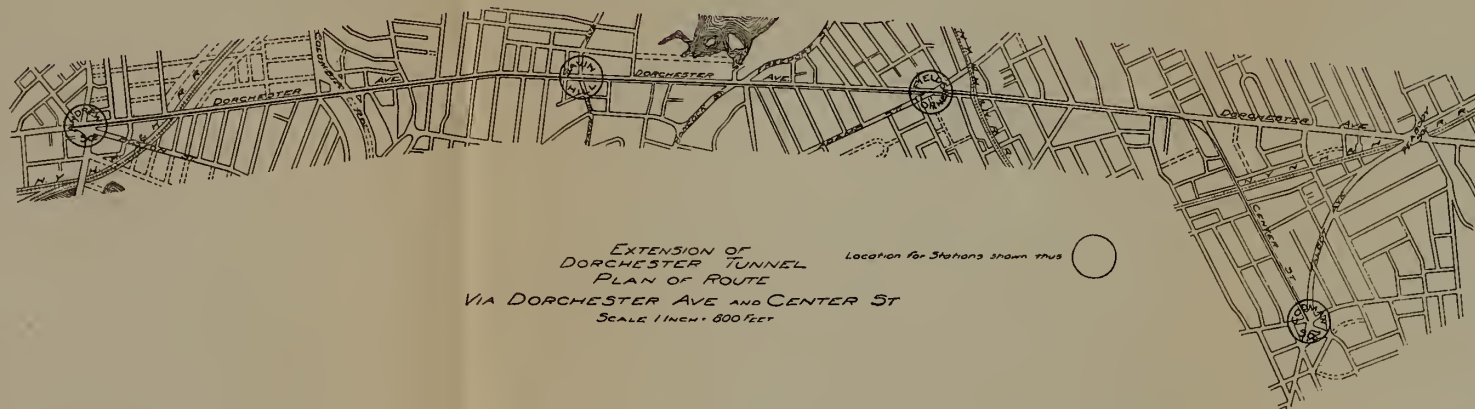
### ENGINEER'S REPORT.

BOSTON TRANSIT COMMISSION,  
15 BEACON STREET, BOSTON, Dec. 31, 1912.

MESSRS. GEORGE G. CROCKER, GEORGE F. SWAIN, HORACE G. ALLEN,  
JOSIAH QUINCY and JAMES B. NOYES, *Boston Transit Commissioners.*

GENTLEMEN:—With reference to chapter 27 of the Resolves of the Massachusetts Legislature, session of 1912, in regard to a route for an extension of the Dorchester tunnel in the city of Boston, I beg leave to report that from the best available information which could be obtained in the time allowed, preliminary studies, estimates and maps have been prepared in compliance with your instructions showing two routes for an extension of the Dorchester tunnel from Andrew square to Codman square. One of them is by the way of Dorchester avenue and Centre street, a distance of about 3 miles. Stations on this line might be located at or near Savin Hill avenue, at or near Field's Corner and in or near Codman square. The cost of construction of such an extension, including the cost of making such changes of water pipes and sewers as may be required, and exclusive of land damages, is estimated, roughly, to be about \$6,100,000. Another study via Upham's Corner shows a route leaving Dorchester avenue a little south of Andrew square, deflecting in a southwesterly direction, passing beneath the New York, New Haven & Hartford Railroad and running under or near Boston street and Columbia road to near Quincy street, thence in a southerly direction under streets and private lands to near the intersection of Bowdoin street and Geneva avenue, thence in a southerly direction in, under or near Bowdoin street and private lands and

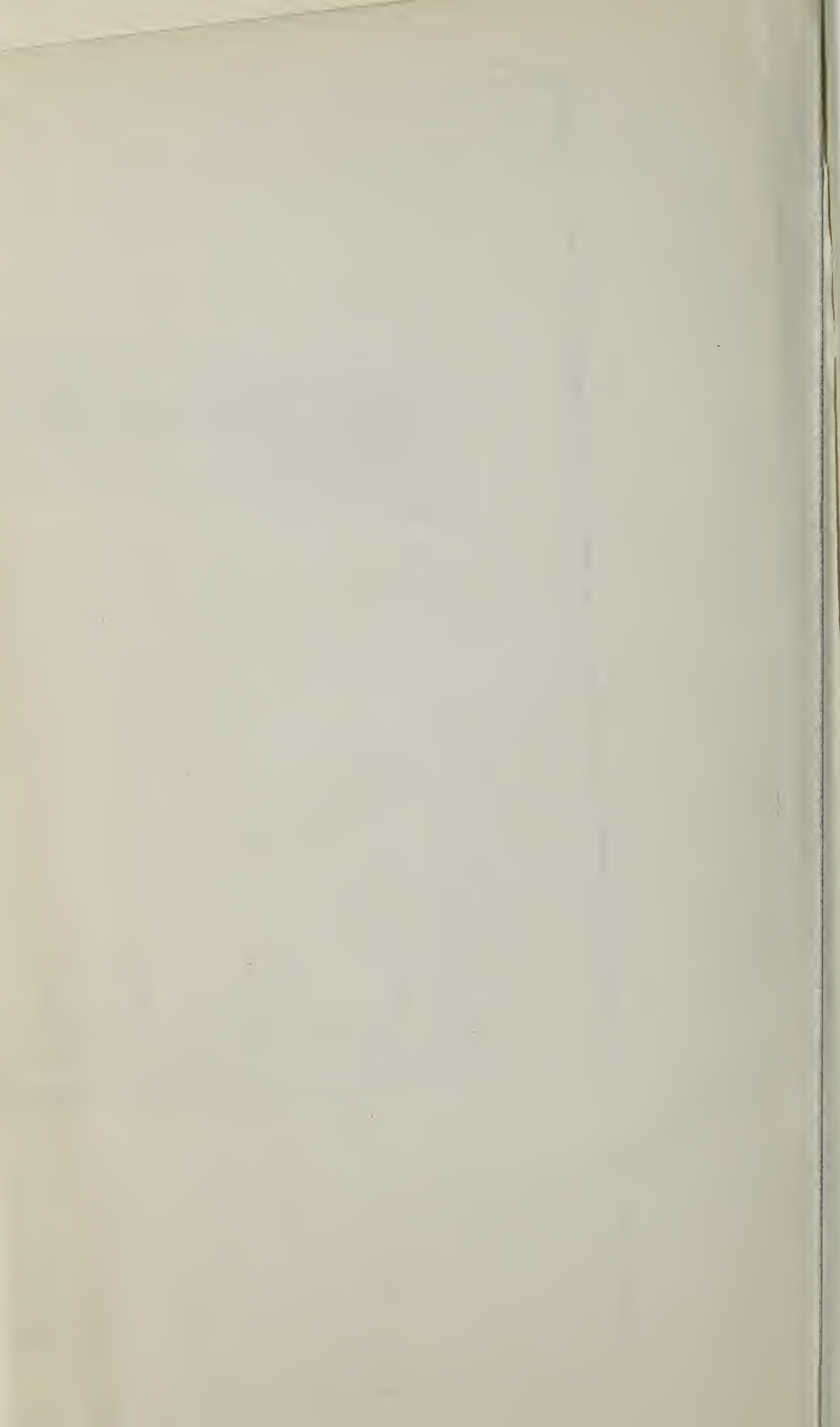
## ROUTE 1



PROFILE OF ROUTE  
VIA DORCHESTER AVE. AND CENTER ST.  
HOR SCALE 1/INCH = 800 FT  
VERT SCALE 1/INCH = 40 FT

TO ACCOMPANY REPORT OF  
BOSTON TRANSIT COMMISSION  
UNDER RESOLVES 1912 CHAPTER 27





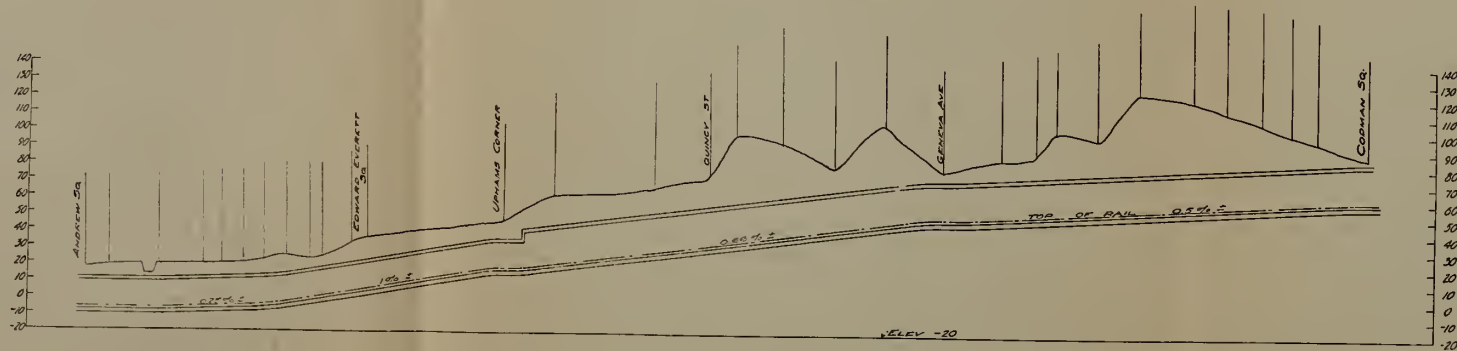


# ROUTE 2



EXTENSION OF  
DORCHESTER TUNNEL  
PLAN OF ROUTE  
VIA UPHAMS CORNER  
SCALE 1 INCH = 800 FEET

Location for Stations shown thus



PROFILE OF ROUTE  
VIA UPHAMS CORNER  
HOR SCALE 1 INCH = 800 FEET  
VERT SCALE 1 INCH = 40 FEET

TO ACCOMPANY REPORT OF  
BOSTON TRANSIT COMMISSION  
UNDER RESOLVES 1912 CHAPTER 27



Washington street to Codman square, the total distance being about 15,000 linear feet or about 2.85 miles. It is assumed that stations would be located at or near Upham's Corner, at or near the intersection of Geneva avenue and Bowdoin street and in or near Codman square. The cost of construction of the extension on this route, including the cost of making such changes of water pipes and sewers as may be necessary and exclusive of land damages, is estimated roughly to be about \$6,300,000. A considerable portion of this route will be in rock excavation, and on account of the irregularity of the streets parts of the tunnel would be under private land, but mostly at such a depth that buildings on the surface would not be materially injured.

Very respectfully,

EDMUND S. DAVIS,  
*Chief Engineer.*

## APPENDIX D.

## [CHAPTER 775.]

## AN ACT TO PROVIDE FOR THE CONSTRUCTION OF ADDITIONAL TUNNELS AND SUBWAYS IN THE CITY OF BOSTON.

*Be it enacted, etc., as follows:*

SECTION 1. The Boston transit commission, hereinafter called the commission, shall construct in the city of Boston, hereinafter called the city, a system of tunnels and subways so designed as to be adapted for the use of two tracks, especially for the use of elevated cars or trains, beginning at a point at or near the northerly end of the present Washington street tunnel, through or under public or private land, public streets, squares or places and under Causeway street and under the Charles river in a northerly direction, and thence along and by such route in the direction of City square and Main street to Sullivan square as shall be deemed best by the commission, to a point at or near or beyond Sullivan square, together with the approaches, sidings, entrances, stations, elevators, inclines, connections and other structures hereinafter called appurtenances, which shall also include the connections at grade or otherwise with the present Washington street tunnel. The commission shall if it deems best so construct said tunnel or subway beginning at or near City square, thence in a northerly direction through Main street to Sullivan square; said tunnel to connect with the elevated structure at or near or beyond the Charlestown bridge. The commission may for the purpose of connection with the present Washington street tunnel or for the purpose of connecting said tunnel with the present elevated structure at or near or beyond the Charlestown bridge excavate or do such things as may be necessary underneath, upon or over the surface of the tracks or street, upon the locations granted to the Boston Elevated Railway Company, or to the city. The structure or structures for the tunnel or subway with the appurtenances or any part thereof shall be begun at any time after the acceptance of this act by the voters of the city of Boston voting thereon at the next city election, if and so far as the commission deems it expedient and if the company by its directors consents.

SECTION 2. The commission shall immediately after the passage of this act make such preliminary investigations, surveys, and plans as it deems expedient and to that end may enter upon any lands and place and maintain marks thereon, and may make excavations, borings and do all other acts necessary for such investigations and surveys. The commission may expend such sums of money as it deems necessary therefor to be paid by the treasurer of the city of Boston, but if construction is begun hereunder, the amount so expended shall be transferred and charged to the cost of construction.

SECTION 3. The commission shall not begin the work of construction until it has filed in the office of the city engineer a plan signed by the commission showing the location of that part of the work which it is about to construct. Any such plan so filed may be altered at any time by a new plan signed and filed in like manner.

SECTION 4. The commission may make contracts in the name of the city for the work herein authorized, but all contracts involving two thousand dollars or more in amount shall be in writing and signed by a majority of the commission and no such contract shall be altered except by an

instrument in writing signed by the contractor and a majority of the commission, and also by the sureties, if any, on the bond given by the contractor for the completion of the original contract. No such contract or alteration of any such contract shall be valid or binding on the city unless executed in the manner aforesaid.

SECTION 5. All work under this act under or near public streets, and places shall be conducted, so far as practicable, in such manner as to leave such streets and places or a reasonable part thereof open for traffic between the hours of eight in the forenoon and six in the afternoon of each secular day except public holidays, and provision shall be made for the protection of the elevated structure so as not to disturb or interfere with the use thereof for public travel.

SECTION 6. The commission may, for the purposes of this act, use public ways and lands without compensation therefor, and may take for the city, by purchase or otherwise, lands in fee and easements, estates and rights in land, including the right to go under the surface thereof or through or under buildings or parts of buildings thereon; and such takings in fee or otherwise may be made whether the lands taken or otherwise affected are held under or by title derived under eminent domain or otherwise. A taking under this section of an easement or other estate or right in a given parcel of real estate, whether such parcel consists of unimproved land or of land and buildings, may be confined to a portion or section of such parcel fixed by horizontal planes of division below or above or at the surface of the soil, and in such case no taking need be made of upper or lower portions or sections except of such easements therein, if any, as the commission may deem necessary. The commission, to make any taking by right of eminent domain, shall cause to be recorded in the registry of deeds for the county of Suffolk, a description of the lands, easements, estates or rights to be taken, as certain as is required in a common conveyance of land, with the statement that the same are taken under authority of this act. Said description and statement shall be signed by the commission; and the lands, easements, estates or rights therein described shall upon such recording be taken for, and shall vest in, the city. The commission shall, so far as may be practicable, notify all known owners of such takings, but the validity of any taking shall not be affected by want of such notice.

SECTION 7. The commission may sell or remove the buildings from any and all lands taken by it, and shall sell, if a sale be practicable, or if not shall lease, any lands, or rights or interests in land and other property so taken or purchased for the purposes of this act whenever the same shall, in the opinion of the commission, cease to be needed for such purposes but not actually sold, as agreed on by the commission and the company, or, in case of difference as determined by the board of railroad commissioners, hereinafter called the board, shall be deducted from the cost of the tunnel or the subway, as the case may be, for the purpose of ascertaining the rental thereof.

SECTION 8. The commission shall determine and award the damages sustained by any person or railroad company by reason of property taken or injured by the commission under authority of this act, except public ways or lands, and may agree with any person as to the amount to be paid as damages sustained by him for any property so taken or injured, which damages the city shall be liable to pay. If such person or railroad company is dissatisfied with such award, or cannot agree with the commission upon his damages, the same may be determined by a jury in the superior court for the county of Suffolk, on petition thereof of such person or of the commission against the city, filed in said court within three years after such property is so taken or injured; and judgment shall be entered upon the determination of such jury and costs shall be taxed and execution issued in favor of the prevailing party as in civil actions. The members of the commission shall not be personally liable for any such damage.

SECTION 9. The commission may order the temporary removal or relocation of any conduits, pipes, wires, poles or other property of any



person or corporation, which it deems to interfere with the construction or operation of the tunnel or subway, and shall grant new locations for any such structures so removed or relocated. Such orders, to the extent specified therein, shall be deemed a revocation of the right or license to maintain such tracks, conduits, pipes, wires, poles or other property, and the owner of any such structures in public ways or lands shall comply with such orders without expense to the city. If such owner shall fail to comply with the order of the commission within a reasonable time, to be fixed in the order, the commission may discontinue and remove such tracks, conduits, pipes, wires, poles or other property, and may relocate the same; and the cost of such discontinuance, removal or relocation shall be repaid to the city by the owner. No such discontinuance, removal or relocation shall entitle the owner of the property thus affected to any damages on account thereof. Any such structures in or upon private lands may be removed and relocated by the commission, or, if removed and relocated by the owner thereof, the reasonable expense shall be repaid him by the commission. Any gas company may shut off the gas from any pipes affected by any acts done hereunder, when and so far as it may be necessary to avoid danger of escape or explosion of gas.

SECTION 10. The commission shall, within ninety days after the passage of this act, execute with the company in the name of the city, the company consenting thereto, a contract in writing for the sole and exclusive use of the tunnel and subway and appurtenances for a term extending not beyond the expiration of existing leases of subways from the city to the company, at an annual rental equal to four and one half per cent of the net cost, as hereinafter determined, of the tunnel and subways, respectively, for the running of trains and cars therein, and for such other uses and upon such provisions and conditions, not affecting the term or rental, as the commission and the company may agree upon, or in case of difference, as the board may determine. The provisions of this act, in so far as they declare, define or establish the terms and conditions for the construction, tenure, maintenance and operation of said tunnel, subway and appurtenances, shall be embodied in and made part of said contract. The use of the tunnel or subway respectively shall begin when, in the opinion of the commission, a reasonable time after completion has been allowed for equipment. The net cost of the tunnel and subway respectively shall be deemed to include all expenditures incurred in acquisition and construction, including all damages, expenses and salaries of the commission, and any sums paid under the provisions of this act for the removal of the elevated structure and the carrying out of the provisions hereof, and interest at three and one fourth per cent per annum on the debt incurred in construction prior to the beginning of the use. If the contract for the use of the tunnel and subway is executed as above provided the commission, upon the acceptance of this act by the voters of the city as hereinafter provided, shall proceed with the work of construction.

SECTION 11. If the company shall execute the contract hereinbefore provided for, the company may, before the completion of the tunnel, construct lines of elevated railway according to such plans as may be approved by the board, to be operated by electricity in respective locations heretofore granted to the company upon and over the Charlestown bridge and upon and over Causeway street, to connect with the present Washington street tunnel and the subway or tunnel to be constructed under the provisions of this act. If the commission shall decide to extend the present Washington street tunnel, as provided for in section one of this act, the company shall not operate and maintain said elevated structure provided for in this section.

SECTION 12. Upon the determination by the commission of any important question arising in the course of the work herein provided for, upon which the company has previously requested a hearing, except an award of or agreement upon damages as provided in section eight of this act, the company may within three days after notice of such determination apply to the board for a revision of the same, and thereupon the board may consider and finally determine such question.

SECTION 13. Wherever the routes upon which the commission is authorized to construct the tunnel or subway cross underneath the locations or tracks of any railroad company, the crossing and the necessary excavations shall be made in such manner and the method of construction shall be such as may be agreed upon between the directors of said railroad company and the commission, and if the parties are unable to agree as to the manner of crossing underneath the tracks or as to the method of construction at that point, the same shall be determined by said board upon the application of either party.

SECTION 14. The treasurer of the city shall from time to time, on request of the commission, issue and sell at public or private sale, the bonds of the city, registered or with interest coupons attached, as he may deem best, to an amount not exceeding the cost of the tunnel and subway herein provided for. Such bonds shall be designated on their face, Boston Extension Tunnel and Subway Loan, shall be for such terms, not exceeding fifty years, as the mayor and treasurer of said city may determine, and shall bear interest, payable semi-annually, at such rate, not exceeding four per cent per annum, as the treasurer shall determine. The debts incurred by the city from time to time under the provisions of this act shall not be included in determining the limit of indebtedness of the city as established by law, and the proceeds of such bonds shall be used to meet all damages, costs and expenses incurred by the commission or by the city in carrying out the provisions of this act. The board of commissioners of sinking funds shall establish a sinking fund for the payment of the bonds issued under this act. All premiums received from the sale thereof shall be paid into the sinking fund. All rents, tolls, percentages, betterments, and not less than one hundred thousand dollars, out of the taxes collected by the city from personal property and real estate or other annual compensation received by the city for any use of the tunnel or subway under this act, or for any use of any lands or rights taken under authority of this act, shall annually be used by the treasurer,—first, to meet the requirements of, and any deficiency in, the sinking fund,—second, to meet the interest on the bonds, and the surplus, if any, as a part of the general revenue of the city. The proceeds from any sale of lands or rights taken by purchase or otherwise under authority of this act shall be paid into the sinking fund, or shall be used for construction, as the commission may determine.

SECTION 15. The supreme judicial court and the superior court, upon application of any party in interest, including the city or any ten taxable inhabitants thereof, may enforce or prevent violation of the provisions of this act by any appropriate process.

SECTION 16. If the contract for the use of the tunnel and subway is executed by the commission and the company as hereinbefore provided, this act shall be submitted for acceptance to the voters of the city of Boston at the next city election, and if accepted by a majority of the voters voting thereon, it shall thereupon take full effect. The city shall have, hold and enjoy in its private or proprietary capacity, for its own property, the tunnel or subway built under this act, and all rents, tolls, income and profits from all contracts heretofore or hereafter entered into for the use of said subways or tunnels or any part thereof, and the same shall never be taken by the commonwealth, except on payment of just compensation: *provided, however*, that so much of such rents, tolls, income and profits as may be necessary therefor shall be paid into the sinking fund for the redemption of said bonds and used for the payment of the interest thereon.

SECTION 17. Upon the completion of the tunnel or subway and appurtenances and upon notification as herein provided, the commission shall remove, and the company shall forthwith discontinue the use of, the elevated structure of the company between the points where the subway or tunnel has been constructed under the provisions of this act and as shall be determined by the commission. The expense of removing the elevated structure between the points aforesaid shall be deemed a part of the cost of the tunnel or subway. The tunnel or subway during the term of the contract hereinbefore provided for shall be considered a part of the ele-

vated railway operated by the company; and the board, subject to the provisions hereof, shall have and exercise the same power and control over the same in all respects that are conferred upon the board as to the elevated structure by chapter five hundred and forty-eight of the acts of the year eighteen hundred and ninety-four, chapter five hundred of the acts of the year eighteen hundred and ninety-seven and by other acts in addition thereto or in amendment thereof. The company, upon removal of the existing structure may sell any lands or other property acquired for the purposes of operating its elevated railway between the points aforesaid, applying all proceeds thereof to proper corporate uses; and such discontinuance or sale shall not be deemed to impair the capital of the company. [*Approved June 13, 1913.*]

## APPENDIX E.

## [CHAPTER 777.]

AN ACT TO MODIFY CERTAIN LOCATIONS OF THE BOSTON ELEVATED RAILWAY COMPANY AND TO PROVIDE FOR THE CONSTRUCTION OF A SUBWAY IN THE CITIES OF EVERETT AND MALDEN.

*Be it enacted, etc., as follows:*

[The first twenty-five sections of the Act relate to the construction by the Boston Elevated Railway Company of subways in Everett and Malden with powers and restrictions similar to those obtaining in acts under which the Commission is operated, with slight alterations to meet the present case. The portion of the Act relating to the Commission follows.]

## PART III.

SECTION 26. If the company does not, within five years after the date of acceptance of this act, begin to construct the subway authorized by Part II of this act, the cities of Everett and Malden, acting through the Boston transit commission, hereinafter called "the commission", as herein provided, may construct the subway as specified in section five. The commission shall begin the construction of the said subway when, after the expiration of said five-year period without the beginning of the construction of said subway by the company, the commission shall be requested in writing by the mayor and aldermen of each of said cities to undertake the construction of said subway.

SECTION 27. The commission, acting in the name and behalf of said cities and the company, shall, within ninety days after receipt by the commission of the request from the cities as provided in section twenty-six, execute a contract in writing for the sole and exclusive use of the subway by the company for the running of its cars therein, and for such other uses as the commission and the company may agree upon. The annual rental of said subway shall be an amount equivalent to four and one half per cent of the net cost of the subway, and said contract shall be in force for a period of twenty-five years, and shall continue in full force and effect after the expiration of said twenty-five years unless and until said contract is terminated by notice either from the cities of Everett and Malden or from the company, as hereinafter provided. The cities may terminate said contract at the expiration of said twenty-five-year period, or at any time thereafter, by giving to the company at least two years' prior notice in writing, which notice it shall be the duty of the mayors of said cities to give if directed so to do by act of the general court, or if directed so to do by votes of the respective boards of aldermen of said cities. The company may, likewise, terminate said contract at the expiration of said twenty-five-year period, or at any time thereafter, by giving to the mayor of each of said cities at least two years' prior notice in writing. No notice on the part of either the cities or the company shall be given more than three years prior to the expiration of said twenty-five-year period. The said contract shall contain such other provisions and conditions, not affecting the term or the rental, and following, so far as the same is applicable, the form of the contract made between the city of Boston, acting by the commission, and the company, for the use of the Washington street tunnel, as the commission and the company may agree upon, or, in case



of difference, as the board may determine. The provisions of this act, in so far as they declare, define or establish the terms and conditions for the construction, tenure, maintenance and operation of the subway, shall be embodied in and made a part of said contract. The use of the subway shall begin when, in the opinion of the commission, a reasonable time after completion has been allowed for equipment. The net cost of the subway shall be deemed to include, except as otherwise provided herein, all expenditures incurred in acquisition and construction, including damages, expenses of the commission, including such part of the compensation of its members, its chief engineer, secretary and office employees as the commission may from time to time determine to be equitable and proportionally chargeable to the work authorized by this act; and interest on the debt incurred in construction prior to the beginning of the use, at the rate of three and one quarter per cent per annum. The commission shall determine the cost of the construction of the part of said subway situated within the city of Everett, and also the cost of construction of the part of said subway situated within the city of Malden, and the rental payable under said contract shall be paid to the respective cities in proportion to the cost of the part of the subway within each of said cities.

SECTION 28. The commission shall not begin the work of construction until it has filed, in the office of the engineer of each of said cities, a plan signed by the commission, showing the proposed route and the general form and method of construction and the location of the proposed tracks, stations, approaches and connections, and the alignment and grade of the part of said subway, and its appurtenances, to be located within such city, and the said plan shall be submitted to the company for its examination. Any such plan, so filed, may be altered at any time by a new plan signed, submitted and filed in like manner.

SECTION 29. The commission shall, immediately after the receipt of the request from said cities specified in section twenty-six, make such preliminary investigations, surveys and plans as it may deem expedient, and to that end may enter upon any lands, and place and maintain marks thereon, and may make excavations and borings and do all other acts necessary for such investigations and surveys and may expend such sums as it deems necessary therefor. The expense of such investigations and surveys shall be deemed a part of the cost of the subway. The construction of the subway shall be begun immediately after the contract for the use of the subway has been executed by the commission and the company.

SECTION 30. The commission may make contracts in the name of each of said cities for the work herein authorized to be done within the limits of such city, but all contracts involving two thousand dollars, or more, in amount, shall be in writing and shall be signed by a majority of the commission; and no such contract shall be altered except by a majority of the commission; and also by the sureties, if any, on the bond given by the contractor for the completion of the original contract. No such contract and no such alteration of any such contract shall be valid or binding on either of said cities unless executed in the manner aforesaid.

SECTION 31. All work done by the commission under this act under or near public streets and places shall be conducted, so far as may be practicable, in such manner as to leave such streets or places, or a reasonable part thereof, open for travel between the hours of seven in the forenoon and six in the afternoon of each secular day, except legal holidays: *provided, however*, that any public way or place may, if the commission deems it necessary, be closed to public travel for distances not exceeding one third of a mile each along the line of construction.

SECTION 32. The commission may, for the purposes of this act, use public ways and lands without compensation therefor, and may take, or acquire by purchase or otherwise, for either of said cities, lands in fee and easements, estates, and rights in land, including the right to go under the surface thereof, or through or under buildings or parts of buildings thereon; and such taking, in fee or otherwise, may be made whether the lands taken or otherwise affected are held under or by title by right of eminent domain,



or otherwise, and may be made for the purpose of providing locations for pipes, wires, conduits and other structures, the relocation of which is made necessary or expedient by the construction of any subway or tunnel authorized by this act. The taking, under this section, of an easement, or other estate or right in a given parcel of real estate, whether such parcel consists of unimproved land or of land and buildings, may be confined to a portion and section of such parcel fixed by planes or other surfaces of division, below, above or at the surface of the soil; and in such cases no taking need be made of upper or lower portions or sections, except of such easements therein, if any, as the commission may deem necessary. The commission, to make any taking by right of eminent domain shall cause to be recorded in the registry of deeds for the southern district of the county of Middlesex a description of the lands, easements, estates or rights to be taken, as certain as is required in a common conveyance of land, with the statement that the same are taken under authority of this act, which description and statement shall be signed by the commission; and the lands, easements, estates or rights therein described shall, upon such recording, be taken for and shall vest in the city for which the taking is made. The commission shall, so far as may be practicable, notify all known owners of such proposed taking, but the validity of the taking shall not be affected by want of such notice.

SECTION 33. The commission may sell the buildings and other structures upon any lands acquired by it, or may remove the same; and shall sell, if the sale be practicable, or if not, shall lease any lands or rights or interest in lands, or other property acquired for the purposes of this act, whenever the same shall, in the opinion of the commission, cease to be needed for the said purposes. The proceeds of the sales and leases, and the fair valuation of such lands or other property, no longer needed for the said purposes, but not actually sold, as agreed upon by the commission and the company, or, in case of difference, as determined by the board, shall be deducted from the cost of the subway in the city within which such lands are situated, for the purpose of ascertaining and paying the rental thereof.

SECTION 34. The commission may determine and award the damages sustained by any person by reason of any property, except public ways or lands, taken or injured by the commission under authority of this act, and may agree with any such person as to the amount of his damages, which amount the city in which such lands are situated shall be liable to pay. If any such person is dissatisfied with such award, or cannot agree with the commission upon his damages, the same may be determined by a jury in the superior court for the county of Middlesex, on petition therefor of such person or of the commission against the city in which such lands are situated, filed in the clerk's office within two years after the property is taken, entered upon or injured; and judgment shall be entered upon the determination of the jury, and costs shall be taxed and execution issued in favor of the prevailing party as in other civil cases. The members of the commission shall not be liable, personally, for any such damages. The provisions of sections seventeen to twenty-five, inclusive, and of section one hundred and fourteen, of chapter forty-eight of the Revised Laws, relating to procedure in the case of damage to estates in which several parties have different, or several interests, shall apply to proceedings in such cases under this act.

SECTION 35. The commission may order the temporary or permanent removal or relocation of any surface tracks, or of any conduits, pipes, wires, poles or other property of any person or corporation, which it deems to interfere with the construction or operation of the subway authorized by this act, and shall plan new locations for any such structures so removed or relocated. Such orders, to the extent specified therein, shall be deemed a revocation of the right or license to maintain such tracks, conduits, pipes, wires, poles or other property, and the owners of such tracks or other property shall comply with said orders without expense to the city in which such streets are situated. If any such owner shall fail to comply with the order of the commission within a reasonable time, to be

fixed in the order, the commission may discontinue and remove such tracks, conduits, pipes, wires, poles or other property, and may relocate the same, and the cost of such discontinuance, removal or relocation shall be repaid by the owner to the city in which such streets are situated. No such discontinuance, removal or relocation shall entitle the owner of the property thus affected to any damages on account thereof. Any such structures in or upon private lands may be removed and relocated by the commission, or if removed and relocated by the owner thereof, the reasonable expense of such removal and relocation shall be paid to him by the commission. Any gas or electric lighting company may shut off the gas or current from any pipes or wires affected by any acts done hereunder, so far as may be necessary to avoid danger of escape or explosion of gas, or other danger.

SECTION 36. Upon the determination by the commission of any important question relating to any plan or work herein provided for, except an award of or agreement upon damages as provided in section thirty-four hereof, the company may, within three days after notice of such determination, apply to the board for revision of the same, and thereupon, the board may consider and finally determine such question.

SECTION 37. The company, for the equipment of the subway which the cities are authorized to construct under section twenty-six of this act, and for all expenditures by the company required or authorized for the equipment of the said subway, may, from time to time, in the manner and under the requirements prescribed by law, issue and dispose of such amounts of its capital stock and bonds, or of each, at its option, as may be necessary therefor. In respect to the equipment, use and operation of the railway to be situated in the subway, and to transportation therein, the company shall have all the powers and privileges, and be subject to all the duties, liabilities, restrictions and provisions set forth in the general and special laws now or hereafter in force applicable to it. To provide for proper connections with any subway station authorized by this act, the company may make such alterations or extensions of its surface tracks and appurtenances as the board may approve.

SECTION 38. The subway authorized by section twenty-six shall be considered a part of the elevated railway operated by the company; and the railroad commission, subject to the provisions of the contract, shall have and exercise the same power and control over the said subway, in all respects, that are conferred upon the board of railroad commissioners in regard to the elevated structure by chapter five hundred and forty-eight of the acts of the year eighteen hundred and ninety-four, and by chapter five hundred of the acts of the year eighteen hundred and ninety-seven, and by any other laws relative thereto. The provisions of the compensation clause of section ten of chapter five hundred of the acts of the year eighteen hundred and ninety-seven shall, for the purpose of distribution of the tax thereby imposed, include the additional track mileage of the company constructed in the subway authorized by section twenty-six of this act.

SECTION 39. The treasurer of each of said cities, for the purpose of paying the necessary expenses and liabilities incurred under this act, shall from time to time, upon the request of the commission, issue and sell at public or private sale bonds of such city, registered or with interest coupons attached, as he may deem best, to an amount not exceeding the cost of the subway within the limits of such city, as determined by the commission. Such bonds shall be designated on their face, Everett-Malden Subway Loan, Act of 1913, shall be for such terms, not exceeding fifty years, and shall bear interest semi-annually at such rate, not exceeding four per cent per annum, as the mayor and the treasurer of the city issuing the bonds shall determine. The debts incurred by each of said cities from time to time under the provisions of this act shall not be included in determining the statutory limit of indebtedness of the city. The proceeds of the said bonds shall be used by the commission to meet all damages, costs, and expenses incurred by the commission in carrying out the provisions of Part III of this act. The bonds shall be payable by such annual pay-

ments beginning not more than five years after the date thereof as will extinguish each loan within fifty years from its date, but all loans issued subsequent to the completion of said subway shall be payable by such annual payments beginning not more than one year after the date thereof as will extinguish each loan within fifty years from its date; and the amount of the annual payment of any loan in any year shall not be less than the amount of the principal of said loan payable in any subsequent year. Each authorized issue of bonds shall constitute a separate loan. All rents, tolls, percentages, or other annual compensation received by the city for any use of the subway constructed under authority of this act, shall annually be used by the treasurer of such city to meet, (1) the payment of said bonds as they mature, (2) the interest on the subway bonds issued by such city; and the surplus, if any, shall be placed in a fund for the purchase or cancellation of bonds issued under authority of this act. The proceeds from any sale of lands, rights or other property acquired under authority of this act shall be paid into the said fund of the city in which such lands or other property is situated, or shall be used for construction, as the commission may determine.

SECTION 40. Each of said cities shall severally hold and enjoy in its private or proprietary capacity that part of the subway built under the provisions of Part III of this act, within its limits, and the company shall, in accordance with its contract, pay to such city such portion of the rental for the subway as is proportional to the cost of the construction of that part of the subway within the limits of such city as determined by the commission; and the part of the subway owned by each of said cities shall never be taken by the commonwealth except upon payment of just compensation: *provided, however*, that each of said cities shall, at the time of authorizing said loan or loans, provide for the payment thereof in accordance with the provisions of section thirty-nine of this act; and when such provision has been made a sum which, with the income derived from rents, tolls, percentages, or other compensation received by the city for any use of the subway under this act, and the amounts received from the sale of lands or rights taken or purchased hereunder, will be sufficient to pay the interest as it accrues on the bonds issued as aforesaid by the cities and to make such payments on the principal as may be required under the provisions of this act shall, without further vote, be assessed by the assessors of the city annually thereafter, in the same manner in which other taxes are assessed, until the debt incurred by said loan or loans is extinguished.

#### PART IV.

SECTION 41. The supreme judicial court or superior court, upon application of either of said cities, the company, or of any other party in interest, may enforce, or prevent the violation of, any provision of this act by any appropriate process.

SECTION 42. This act shall take effect upon its acceptance by the mayor and the board of aldermen of the city of Everett, and by the mayor and the board of aldermen of the city of Malden, and by the company by vote of its board of directors, and return thereof made to the secretary of the commonwealth within two months after its passage.

SECTION 43. In case this act shall not be accepted as provided in section forty-two, then the period specified in chapter four hundred and ninety-seven of the acts of the year nineteen hundred and seven for the construction by the company of an elevated railway for the cities of Boston, Everett and Malden, authorized by said chapter four hundred and ninety-seven, is hereby extended for a period of eighteen months. This provision shall not be construed to limit in any way the power of the board to allow further time for the construction of said elevated railway as provided in section six of the said chapter four hundred and ninety-seven. This section shall take effect upon the passage of this act. [*Approved June 13, 1913.*]

## APPENDIX F.

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[CHAPTER 69.]

RESOLVE TO PROVIDE FOR INVESTIGATING THE ADVISABILITY OF CONSTRUCTING A STATION FOR THE WASHINGTON STREET TUNNEL AT OR NEAR BENNET STREET IN THE CITY OF BOSTON.

*Resolved*, That the Boston transit commission shall investigate the desirability and practicability, and estimate the cost, of constructing a station for the Washington street tunnel in the city of Boston at or near Bennet street. The commission may give public hearings, if it deems them necessary, and shall report to the next general court on or before the tenth day of January. [*Approved April 26, 1913.*]



## APPENDIX G.

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[CHAPTER 78.]RESOLVE RELATIVE TO THE CONSTRUCTION OF A TUNNEL BETWEEN THE  
CITIES OF BOSTON AND CHELSEA.

*Resolved*, That the Boston transit commission shall estimate the cost of constructing a tunnel and subway for the use of trolley cars, with a double track, between the city of Boston and the city of Chelsea. The commission shall report which would be the better route, in its judgment, either from the present subway in Haymarket square by the way of Charlestown, or from the present subway in Scollay square running under the harbor directly to the city of Chelsea, and shall state the probable cost of the tunnel and subway by each route and the feasibility of the construction thereof. The commission shall report to the general court on or before the tenth day of January, nineteen hundred and fourteen. The expense incident to the said investigation shall be borne equally by the city of Boston and the city of Chelsea. [*Approved May 8, 1913.*]



## APPENDIX H.

## [CHAPTER 84.]

RESOLVE TO PROVIDE FOR AN INVESTIGATION RELATIVE TO THE REMOVAL OF THE ELEVATED STRUCTURE ON WASHINGTON STREET AND MAIN STREET IN THE CITY OF BOSTON AND THE EXTENSION OF THE WASHINGTON STREET TUNNEL TO DUDLEY STREET AND THE CONSTRUCTION OF A SUBWAY FROM CITY SQUARE TO SULLIVAN SQUARE IN SAID CITY.

*Resolved*, That the Boston transit commission is hereby authorized and directed to investigate and report to the general court on or before the first Monday in January, nineteen hundred and fourteen, in regard to the subject-matter of the petition of Louis Berenson, with the accompanying bill, House No. 1511, to provide for the removal of the elevated structure on Washington street in the city of Boston and on Main street in Charlestown, from City square to Sullivan square and for the extension of the Washington street tunnel, beginning at the southerly end of said tunnel, thence running across or underneath public and private lands, thence continuing along Washington street to a point or points at, near or beyond Dudley street in said city, and connecting said subway or tunnel with the elevated structure at, near or beyond Dudley street and for the building of a subway from City square to Sullivan square in Charlestown. The said commission shall ascertain the probable cost of building the subway or tunnel between said points and the probable cost of the removal of the elevated structure, including any damages paid or payable by the Boston Elevated Railway Company to abutters under the provisions of chapter five hundred and forty-eight of the acts of the year eighteen hundred and ninety-four and of acts in amendment thereof and in addition thereto. The commission shall accompany its report with drafts of such bills as it shall deem necessary or suitable for carrying out the purposes of this resolve. The commission shall include in its report an estimate of the loss in tax valuations and taxes since the location, construction and maintenance of the elevated road on all property abutting on the elevated road between the points aforesaid, as well as on all property on streets leading to the street on which said structure is situated between said points. The commission shall also report the probable benefits to real estate owners and other persons as well as to the city of Boston, and shall estimate and report the probable increase in taxes to be paid upon the removal of the elevated structure and the construction of the tunnel between the points aforesaid. The commission shall give advertised public hearings on the subject-matter of this resolve, and may make such investigations, examinations, survey and plans as it shall deem necessary or proper. The commission may expend a sum not exceeding one thousand dollars in carrying out the provisions of this resolve, to be paid out of the treasury of the city of Boston. [Approved May 8, 1913.]

## APPENDIX I.

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[CHAPTER 93.]

RESOLVE TO DIRECT THE BOSTON TRANSIT COMMISSION TO INVESTIGATE AND REPORT UPON THE ADVISABILITY AND COST OF CONSTRUCTING A SUBWAY TO CONNECT THE DORCHESTER TUNNEL WITH THE SOUTH TERMINAL STATION IN THE CITY OF BOSTON.

*Resolved*, That the Boston transit commission is hereby directed to investigate the advisability and to estimate the cost of constructing a subway to form a connection between the Dorchester tunnel provided for by chapter seven hundred and forty-one of the acts of the year nineteen hundred and eleven, and the South station, so-called, in the city of Boston. The commission shall report to the general court not later than the tenth day of January, nineteen hundred and fourteen, and for the purpose of carrying out the provisions of this resolve may expend a sum not exceeding two hundred and fifty dollars, to be paid out of the treasury of the commonwealth. [*Approved May 21, 1913.*]

## APPENDIX J.

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[CHAPTER 108.]

## RESOLVE TO PROVIDE FOR AN INVESTIGATION OF THE SERVICE OF STREET RAILWAY COMPANIES.

*Resolved*, That the members of the board of railroad commissioners and of the Boston transit commission are hereby authorized and directed to act as a joint commission to inquire into and to consider the street railway service furnished by the Boston Elevated Railway Company and the Bay State Street Railway Company in the metropolitan district; and to report their conclusions and recommendations, if any, to the general court on or before the tenth day of next January. The joint commission shall give public hearings and shall have authority to administer oaths and to require the attendance of witnesses and the production of books and papers. Members of the commission shall serve without compensation, but the commission may expend for necessary purposes a sum not exceeding five thousand dollars, which amount shall be assessed upon the metropolitan parks district. [*Approved June 6, 1913.*]

## APPENDIX K.

The names of all the assistants in the Engineering Department who have been employed for more than one month during the last year together with an indication of the work on which they have been engaged, are given below.

*Assistant Engineers.*

LEON N. ALBERTS,	Plans, surveys and studies, East Boston Tunnel Extension.
CHARLES H. BARTLETT,	Detail work on steel structures.
BION A. BOWMAN,	Detail work on steel structures.
C. LEONARD BROWN,	Construction, Sections A and B, Dorchester Tunnel.
WILBUR W. DAVIS,	Studies for a part of Boylston-street Subway; miscellaneous work.
G. DANA EMERSON,	In charge of construction, Sections A and B, Dorchester Tunnel.
ROBERT B. FARWELL,	In charge of surveys, studies and construction, East Boston Tunnel Extension.
JAMES B. FLAWS,	Surveys and borings for Dorchester Tunnel under Fort Point Channel. Assisting the engineer in charge of construction, Sections 1 and 2 of the Boylston-street Subway.
JAMES T. FRAME,	Assisting the engineer in charge of construction, Sections 2, 3 and 4 of the Boylston-street Subway.
AUSTIN B. HENDERSON,	Plans, Sections A and B, Dorchester Tunnel.
LEONARD B. HOWE,	Detail plans, subways and tunnels.
WILLIAM W. LEWIS,	In charge of surveys and plans, Dorchester Tunnel.
ROY M. LOTHROP,	Contract and detail plans for East Boston Tunnel Extension.
LAURENCE B. MANLEY.	In charge of surveys and plans, Boylston-street Subway. In charge of construction, Sections 1, 2, 3 and 4 of the said subway.
CLARENCE D. MAYNARD,	Studies, East Boston Tunnel Extension and Boylston-street Subway.
PHILIP C. NASH,	Construction, Section A, Dorchester Tunnel; plans, East Boston Tunnel Extension.
GEORGE F. OWEN,	Plans, Dorchester Tunnel.
BARZILLAI A. RICH,	Designs for structures, Dorchester Tunnel and Boylston-street Subway, Section 4.
ERNEST R. SPRINGER,	Designs for steel and reinforced concrete structures.
GEORGE H. STEARNS,	In charge of designs for steel work and reinforced concrete structures.

HERBERT R. STEARNS,	Designs and plans for Dorchester Tunnel.
ROBERT K. TAYLOR,	Construction, Sections A and B, Dorchester Tunnel.
PHILIP B. WALKER,	In charge of repair work and tests in East Boston Tunnel. Testing cement, pitch and other materials.

*Draftsmen.*

PAUL P. BANGS,	Blueprinting, etc.
CHARLES R. BERRY,	Contract plans, Boylston-street Subway.
CHARLES L. DOHERTY,	Plans, Dorchester Tunnel.
FREDERICK C. FIGENBAUM,	Plans for pipe relocations and steel plans, East Boston Tunnel Extension.
RALPH A. FISHER,	Steel plans.
WALTER AUGUSTINE FORD,	Steel plans.
GEORGE P. GOODMAN,	Drafting and photography.
SAMUEL C. LYMAN,	Steel plans, Boylston-street Subway and East Boston Tunnel Extension.
ROLAND B. RAND,	Steel plans, Boylston-street Subway, Dorchester Tunnel and East Boston Tunnel Extension.
EDMUND A. RICE,	Plans for structures.
RALPH E. RICE,	Plans, Boylston-street Subway.
CHESTER A. RICHARDSON,	Designs for structures and plans, Dorchester Tunnel.
FREDERIC W. STILES,	Drafting, force accounts, Sections 1 and 2; settlement levels, Sections 3 and 4, Boylston-street Subway.
LAURENCE E. WEEKS,	Line and grade work, East Boston Tunnel Extension.
JOHN M. WISEMAN,	Steel plans, Boylston-street Subway, and East Boston Tunnel Extension.

*Assistants and Instrumentmen.*

FRANCIS V. CAREY,	Plans, Boylston-street Subway.
HENRY L. CROCKER,	Line and grade work, Sections 3 and 4, Boylston-street Subway.
LESTER S. DANIELS,	Plans, line and grade work, and settlement levels, Boylston-street Subway.
*HAROLD M. DAVIS,	Line and grade work, Section 1, Boylston-street Subway.
HARRY R. DRAPER,	Line and grade work, Section A, Dorchester Tunnel. Steel plans, East Boston Tunnel Extension.
HENRY N. HAYWARD,	Line and grade work, Sections A and B, Dorchester Tunnel.
ARTHUR V. LYNCH,	Surveys and plans, Dorchester Tunnel; also on construction work, Section B, Dorchester Tunnel.
LAURENCE K. MARSHALL,	Line and grade work, Sections 1 and 2, Boylston-street Subway.
RALPH C. MCPHERSON.	Surveys and plans, East Boston Tunnel Extension.



JAMES H. O'CONNOR,	Force accounts and miscellaneous work on construction, Sections 2, 3 and 4, Boylston-street Subway.
LAURENCE M. PITMAN,	Line and grade work, Sections 3 and 4, Boylston-street Subway.
CHARLES V. REYNOLDS,	Construction, Sections 2, 3 and 4, Boylston-street Subway.
SIDNEY S. VON LOESECKE,	Surveys and studies, Boylston-street Subway.
WILLIAM L. WRIGHT, JR.,	Plans and pipe changes, Boylston-street Subway.

*Assistants and Rodmen.*

*WILLIAM J. BUCKLEY,	Plans, East Boston Tunnel Extension.
RICHARD A. CASWELL,	Inspection, Sections 1 and 4, Boylston-street Subway.
WILLIAM J. COCHRAN,	Line and grade work, East Boston Tunnel Extension.
EDWIN A. DESMOND,	Rod bending. Line and grade work, Sections 1 and 4, Boylston-street Subway.
WILLIAM G. DOHERTY,	Line and grade work, Sections 2, 3 and 4, Boylston-street Subway.
RAYMOND H. FELLOWS,	Line and grade work, settlement levels, and rod bending, Boylston-street Subway.
WALTER ANTHONY FORD,	Surveys, plans, line and grade work, Boylston-street Subway. Surveys and plans, Dorchester Tunnel.
JOHN F. A. GIBLIN,	Assistant on construction, Sections A and B, Dorchester Tunnel.
*ELIAS S. HANNA,	Surveys and plans, Dorchester Tunnel.
CHARLES H. HARRINGTON,	Line and grade work, Sections A and B, Dorchester Tunnel.
JOHN A. HOLBROOK,	Line and grade work, Sections A and B, Dorchester Tunnel.
THOMAS H. KEENAN,	Repairs in Sections B and C, East Boston Tunnel.
AARON W. KINNE,	Inspection and line and grade work, Sections 1 and 2, Boylston-street Subway, and East Boston Tunnel Extension.
*ARTHUR F. LEARY,	Plans, Dorchester Tunnel.
JOSEPH E. McDERMOTT,	Assistant on construction, Sections A and B, Dorchester Tunnel.
DANIEL G. MOSHER,	Line and grade work, Sections 1, 2 and 4, Boylston-street Subway. Surveys for Dorchester Tunnel under Fort Point Channel.
*EDWARD E. MURPHY,	Line and grade work, Section 1, Boylston-street Subway.
AUSTIN S. PACKARD,	Line and grade work and force accounts, East Boston Tunnel Extension.
WILLIAM J. POWER, JR.,	Line and grade work, Sections 1 and 2, Boylston-street Subway.
HARRY H. THORBURN,	Plans, Boylston-street Subway.

*Inspectors.*

MARTIN C. CHERRY,	East Boston Tunnel Extension.
FREDERICK C. H. EICHORN,	Sections 2, 3 and 4, Boylston-street Subway.
FRANK I. GARFIELD,	Sections 1 and 2, Boylston-street Subway.
*KIMBALL R. GARLAND,	Section 1; also lines and grades, Boylston-street Subway.
JOHN P. MCKNIGHT,	Section 1, Boylston-street Subway.
PERCIVAL H. MOSHER,	Sections A and B, Dorchester Tunnel.
ROBERT P. O'KEEFE,	Sections 3 and 4, Boylston-street Subway.
ALFRED W. PARKER,	Inspector of steel work.
ALFRED E. PERKINS,	Section 2, Boylston-street Subway.
JOSEPH E. REINHALTER,	Sections 2, 3 and 4, Boylston-street Subway.
LEO S. STONE,	Sections 3 and 4, Boylston-street Subway.
WILLIAM G. TONNER,	Sections 1, 2, 3 and 4, Boylston-street Subway.

*Chemists, Testing Material, etc.*

*MANSFIELD K. BERRY,	Testing cement.
SETH M. BRYANT,	Testing cement.
HAROLD C. DELONG,	Chemist in charge of testing cement, pitch and other materials. Superintending making of concrete sheeting, etc.

*Clerical Force.*

ARTHUR B. CARTER,	Secretary to the Chief Engineer.
HARRY E. CASEY,	Stenographer.
CHARLES E. FAY,	Messenger in drafting room; blueprinting; care of plans.
JACOB L. GARBER,	Clerk.
SAMUEL KLUBOCK,	Stenographer.
FRANCIS J. KURRISS,	Clerk and stenographer.
†ROSE A. McMAHON,	Stenographer.
THOMAS J. PETTIT,	Clerk and stenographer.
*JOSEPH E. RILEY,	Stenographer.
JOHN E. RYAN,	Stenographer.
JOSEPH P. SHEERIN,	Clerk.
HENRY C. WHITE,	Stenographer.

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\*Left the employ of the Commission.

†Transferred to Secretary's Department

## APPENDIX L.

CANVASS OF BIDS FOR UNDERPINNING BUILDING AT NORTHEASTERLY CORNER OF SUMMER AND HAWLEY STREETS, SECTION B,  
DORCHESTER TUNNEL. AUGUST 7, 1912.

BIDDER.	417 cu. yds. excavation.	73 cu. yds. concrete.	92 cu. yds. cinder concrete.	19 cu. yds. old masonry removed.	4 cu. yds. brick masonry.	Supporting building.	TOTAL.
Coleman Bros., Pearl & Marginal Sts., Chelsea, Mass.....	\$5.00 2,085.00	\$10.00 730.00	\$6.00 552.00	\$7.00 133.00	\$15.00 60.00	..... 750.00	\$4,310.00
Coughlan & Sheils Co., 43 Tremont St., Boston, Mass.....	4.50 1,876.50	10.00 730.00	7.00 644.00	8.00 152.00	18.00 72.00	..... 700.00	4,174.50

## APPENDIX M.

CANVASS OF BIDS FOR FURNISHING 600 TONS OF  $\frac{7}{8}$ " AND 400 TONS OF 1" SQUARE TWISTED OPEN HEARTH STEEL REINFORCING RODS. DELIVERY TO BE MADE IN INSTALMENTS OF FROM 30 TO 400 TONS, AS REQUIRED BY THE COMMISSION, WITHIN  $1\frac{1}{2}$  MILES OF SOUTH TERMINAL. SEPTEMBER 5, 1912.

BIDDER.	Price per ton.	Amount.
Carnegie Steel Company, 120 Franklin St., Boston, Mass.....	\$32.20	\$32,200.00
Jones & Laughlin Steel Company, 131 State Street, Boston, Mass.....	32.00	32,000.00
Lackawanna Steel Company, 40 Central Street, Boston, Mass.....	31.20	31,200.00

## APPENDIX N.

CANVASS OF BIDS FOR REMOVING OLD BOILER AND FURNISHING AND INSTALLING NEW BOILER IN POLICE STATION 16, CORNER OF BOYLSTON AND HEREFORD STREETS, BOSTON. SEPTEMBER 18, 1912.

BIDDER.	Kind of boiler to be installed.	Amount.
Daniel Russell Boiler Works, Inc., 83 Boston St., So. Boston, Mass.	Cast iron boiler made by the H. B. Smith Co.	\$600.00
Albert B. Franklin, 62 High St., Boston, Mass.....	8-section No. 34 Mills cast iron sectional boiler.	600.00
Walworth-English-Flett Co., 100 Pearl St., Boston, Mass.....	S-36-6 Ideal Sectional steam boiler.	589.00

Awarded to Albert B. Franklin.

# APPENDIX O.

CANVASS OF BIDS. STEEL AND IRON WORK FOR COPLEY SQUARE STATION, SECTION 4, BOYLSTON-STREET SUBWAY. SEPTEMBER 24, 1912.

BIDDER.	185,000 lbs. more or less of structural steel.		15,000 lbs. more or less of cast iron.		TOTAL.	TIME OF DELIVERY.
	Price per lb.	Amount.	Price per lb.	Amount.		
New England Structural Co., 110 State St., Boston.....	\$0.031 * *	\$5,735.00	\$0.03	\$450.00	\$6,185.00	Bethlehem, 4 to 5 months; Standard, 3½ to 4 months.
Lewis F. Shoemaker & Co., Harrison Bldg., Philadelphia, Pa.....	0.0298 * *	5,513.00	0.0298	447.00	5,960.00	30 days after receipt of Bethlehem shapes; 3 months for Standard.
Belmont Iron Works, 22nd St. & Washington Ave., Philadelphia, Pa...	0.028 *	5,180.00 *	0.0275 **	412.50 **	5,592.50 *	Bethlehem 5 months; Standard 3½ months.
	0.03 **	5,550.00 **			5,962.50 **	
Pennsylvania Steel Co., C. S. Clark, Agent, 70 Kilby St., Boston.....	0.0259 **	4,791.50	0.0333	499.50	5,291.00	4 months.
Levering & Garrigues Co., 552 West 23rd St., New York City.....	0.0258 *	4,773.00	0.03	450.00	5,223.00	4 months from order.

\* Bethlehem.

\*\* Standard.

\* \* \* Standard or Bethlehem.





## APPENDIX P.

CANYASS OF BIDS FOR MOVING ELEVATOR MACHINERY AND STEAM RETURN PIPE, 410 NEWBURY STREET, BOSTON. ELEVATOR MACHINERY TO BE MOVED BETWEEN THE HOURS OF 1 P. M. SATURDAY AND 9 A. M. MONDAY. STEAM RETURN PIPE, STRAIGHT TIME. SEPTEMBER 24, 1912.

BIDDER.	Amount.
Buerkel & Co., 24 Union Park St., Boston, Mass.....	\$787.00
William H. Gallison Co., 36 Oliver St., Boston, Mass.....	750.00
Michael J. O'Brien, 9 Province Court, Boston, Mass.....	575.00

## APPENDIX Q.

CANVASS OF BIDS FOR STRUCTURAL STEEL AND CAST IRON FOR MASSACHUSETTS AVENUE STATION, A PART OF SECTION 2, BOYLSTON STREET SUBWAY. SEPTEMBER 24, 1912.

BIDDER.	600,000 lbs., more or less, of structural steel.		30,000 lbs., more or less, of cast iron.		TOTAL.	TIME OF DELIVERY.
	Price per lb.	Amount.	Price per lb.	Amount.		
Boston Bridge Works, 47 Winter St., Boston.....	\$0.0325	\$19,500.00	\$0.0310	\$930.00	\$20,430.00	5 mos. from date of receipt of contract.
New England Structural Co., 110 State St., Boston.....	0.0315	18,900.00	0.0300	900.00	19,800.00	3 or 4 mos. from receipt of complete information ne- cessary to list material.
Belmont Iron Works, 22nd St. and Wash. Ave., Phila., Pa....	0.0297	17,820.00	0.0250	750.00	18,570.00	6 mos. from date of con- tract.
Lewis F. Shoemaker & Co., Harrison Building, Philadelphia, Pa....	0.0291	17,460.00	0.0291	873.00	18,333.00	30 days after receipt of all Bethlehem shapes.

## APPENDIX R.

CANVASS OF BIDS FOR FURNISHING AND ERECTING IN PLACE REINFORCED CONCRETE BALUSTRADE, SIX CONCRETE TROLLEY-POSTS AND CONCRETE PORTAL, FOR INCLINED ENTRANCE AT KENMORE STREET TO THE BOYLSTON-STREET SUBWAY. OCTOBER 29, 1912.  
(CEMENT, TWISTED RODS AND IRON TROLLEY POLES TO BE FURNISHED BY BOSTON TRANSIT COMMISSION.)

BIDDER.	Amount of bid.	Time of Completion.	REMARKS.
Simpson Bros. Corporation, 166 Devonshire St., Boston .....	\$5,600.00	On or about January 1, 1913.	Using granite aggregate similar to Chelmsford granite and treating the surface so that the aggregate will be exposed.
Forbes L. McKenzie, 7 Water St., Boston .....	\$4,580.00	In sixty days.	
*Emerson & Norris Co., 163 North Beacon St., Brighton, Boston .....	4,412.00	Will complete the job in two months from the date of receiving the working drawings and details.	A selected proportioned aggregate revealed by brushing.
Emerson & Norris Co., 163 North Beacon St., Brighton, Boston .....	4,050.00	Will complete the job in two months from the date of receiving the working drawings and details.	Smooth cast surface, limestone color, with the top surface of the cap rail and post caps rubbed down to aggregate.

\* Awarded.

## APPENDIX S.

CANVASS OF BIDS FOR FURNISHING 1,000 LINEAR FEET, MORE OR LESS, OF FENCE AND SIX GATES AND DELIVERING AT YARD AT  
C AND CYPHER STREETS, SOUTH BOSTON. NOVEMBER 19, 1912.

BIDDER.	FENCE.		GATES.		TOTAL.
	Price per linear ft.	Price for 1,000 linear ft.	Price per gate.	Price for six gates.	
James E. Nelson Co., 34-36 Beverly Street, Boston, Mass.....	\$0.92	\$920.00	\$27.25	\$163.50	\$1,083.50
Thomas T. Tracy, 33 Tyler St., Boston, Mass.....	0.80	800.00	15.00	90.00	890.00
J. B. McClellan, 178 Devonshire St., Boston, Mass.....	0.675	675.00	25.00	150.00	825.00



## APPENDIX T.

CANVASS OF BIDS FOR FURNISHING 86,956 LBS. OPEN HEARTH STEEL  
PLATES FOR SECTION B, DORCHESTER TUNNEL. NOVEMBER 19,  
1912.

BIDDER.	Price per lb.	Amount.
Arthur C. Harvey Co., 374 Congress St., Boston, Mass.....	2.15c.	\$1,869.55
H. W. Hayes & Co., 101 Tremont St., Boston, Mass.....	1.88c.	1,634.77

## APPENDIX U.

CANVASS OF BIDS FOR FURNISHING A FOUR-WHEEL, TEN-TON, ELECTRIC  
LOCOMOTIVE CRANE. DECEMBER 9, 1912.

BIDDER.	Amount.
Browning Hoisting Machinery Company.....	\$5,240.00
Browning Engineering Company.....	4,925.00
Ohio Locomotive Crane Company.....	4,900.00
Industrial Works.....	4,800.00
Link Belt Company.....	4,650.00
Orton & Steinbrenner Company.....	3,526.00
*Hugh Nawn Contracting Company.....	2,750.00

\* Second-hand.

Awarded to Orton & Steinbrenner Company.

## APPENDIX V.

CANVASS OF BIDS FOR FURNISHING STEEL AND IRON WORK FOR PART OF SECTION 4, BOYLSTON-STREET SUBWAY.  
DECEMBER 12, 1912.

BIDDER.	540,000 lbs. structural steel.		32,000 lbs. cast iron.		TOTAL.	TIME OF DELIVERY.
	Per lb. cents.	Amount.	Per lb. cents.	Amount.		
W. E. Clark & Co., 120 Milk St., Boston.....	3.94	\$21,276.00	3.94	\$1,260.80	\$22,536.80	6 months.
Belmont Iron Works, 22nd St. and Washington Ave., Phila., Pa.....	3.3	17,820.00	2.75	880.00	18,700.00	6 months, or 45 days after receipt of all Bethlehem material.
New England Structural Co., 110 State St., Boston.....	3.	16,200.00	3.	960.00	17,160.00	5 months.
Pennsylvania Steel Co., 70 Kilby St., Boston.....	2.89	15,606.00	3.	960.00	16,566.00	5 months. (Bid based on standard shapes.)
Boston Bridge Works, 47 Winter St., Boston.....	2.85	15,390.00	2.65	848.00	16,238.00	4½ months.
Lewis F. Shoemaker & Co., Pottstown, Pa.....	2.74	14,796.00	3.25	1,040.00	15,836.00	30 days after receipt of Bethlehem shapes.
Levering & Garrigues Co., 552 West 23rd St., New York City.....	2.514	13,575.60	2.85	912.00	14,487.60	4 months.

# APPENDIX W.

CANVASS OF BIDS FOR CONSTRUCTION, SECTION 4, BOYLSTON STREET SUBWAY. DECEMBER 24, 1912.

BIDDER.	EARTH EXCAVATION.		MASONRY REMOVED.		CONCRETE MASONRY.				LAYING VITRIFIED PIPE.				STEEL WORK.			20,000 Sq. Yds. Cement Plaster.	WATERPROOFING		125,000 lin. ft. Spruce Piles.	Other Work and Risks not included by other items.	1,000 Sq. Yds. Crude Paraffine Applied to Piles per Sq. Yd.	TOTALS.
	90,000 Cu. Yds. above Invert.	7,000 Cu. Yds. below Invert.	50 Cu. Yds. Walls, Foundations, etc.	6,500 Sq. Yds. Concrete Base.	23,000 Cu. Yds. Concrete.	7,000 Cu. Yds. Gravel Concrete.	200 Cu. Yds. Mortar Under Flanges of Beams.	100 Cu. Yds. Brick Masonry.	50 lin. ft. 6" to 10".	1,400 lin. ft. 12" to 20".	700 lin. ft. 22" to 30".	3,000 lin. ft. 4" to 8" for under drain.	1,000 Tons Reinforcing Rods less than 6 lbs. per lin. ft.	400 Tons Structural Steel more than 6 lbs. per lin. ft.	225 Tons Steel Sheet Piling.		40,000 Sq. Yds. Textile and Asphalt.	20,000 Sq. Yds. Tarred Felt and Pitch.				
	a	aa	b	3b	c	cc	3c	d	e	ee	3e	4e	f	ff	3f	g	h	i	j	k	l	
W. H. Keyes & Co., 95 Milk St., Boston, Mass.....	\$4.80 432,000.00	\$7.60 53,200.00	\$10.00 500.00	\$5.00 32,500.00	\$10.00 230,000.00	\$8.00 56,000.00	\$10.00 2,000.00	\$20.00 2,000.00	\$0.90 45.00	\$1.50 2,100.00	\$2.00 1,400.00	\$1.00 3,000.00	\$15.00 15,000.00	\$20.00 8,000.00	\$70.00 15,750.00	\$0.50 10,000.00	\$0.50 20,000.00	\$0.40 8,000.00	\$0.25 31,250.00	\$5,000.00 5,000.00	\$0.20 200.00	\$927,945.00
Coughlan & Sheils Co., 43 Tremont St., Boston, Mass.....	3.90 351,000.00	4.25 29,750.00	18.00 900.00	0.50 3,250.00	9.50 218,500.00	6.00 42,000.00	10.00 2,000.00	18.00 1,800.00	0.50 25.00	0.50 700.00	1.00 700.00	0.50 1,500.00	12.00 12,000.00	18.00 7,200.00	50.00 11,250.00	0.50 10,000.00	0.50 20,000.00	0.30 6,000.00	0.30 37,500.00	5,000.00 5,000.00	0.20 200.00	761,275.00
Coleman Bros., Pearl & Marginal Sts., Chelsea, Mass....	3.67 330,300.00	5.00 35,000.00	10.00 500.00	0.70 4,550.00	9.00 207,000.00	7.00 49,000.00	16.00 3,200.00	20.00 2,000.00	1.00 50.00	1.00 1,400.00	2.00 1,400.00	1.00 3,000.00	10.00 10,000.00	16.00 6,400.00	60.00 13,500.00	0.50 10,000.00	0.50 20,000.00	0.30 6,000.00	0.30 37,500.00	10,000.00 10,000.00	0.30 300.00	751,100.00
P. McGovern & Co., Boston, Mass.....	3.50 315,000.00	3.00 21,000.00	5.00 250.00	0.80 5,200.00	10.00 230,000.00	10.00 70,000.00	20.00 4,000.00	18.00 1,800.00	0.50 25.00	1.00 1,400.00	1.50 1,050.00	0.50 1,500.00	12.00 12,000.00	20.00 8,000.00	75.00 16,875.00	0.30 6,000.00	0.40 16,000.00	0.30 6,000.00	0.27 33,750.00	100.00 100.00	0.10 100.00	750,050.00
Hugh Nawn Cont. Co., 82 Savin St., Roxbury, Mass.....	3.50 315,000.00	4.00 28,000.00	10.00 500.00	0.70 4,550.00	11.00 253,000.00	5.00 35,000.00	15.00 3,000.00	20.00 2,000.00	1.00 50.00	1.00 1,400.00	1.50 1,050.00	0.50 1,500.00	7.00 7,000.00	12.00 4,800.00	60.00 13,500.00	0.40 8,000.00	0.55 22,000.00	0.40 8,000.00	0.25 31,250.00	4,000.00 4,000.00	0.10 100.00	743,700.00



## APPENDIX X.

CANVASS OF BIDS FOR CAST IRON PIPE FOR SEWERS FOR SECTION B., DORCHESTER TUNNEL. MARCH 6, 1913.

BIDDER.	TIME OF DELIVERY.	338 Tons (2000 lbs.) Type A or Type B.		11 Tons (2000 lbs.) Plugs and Branches.		TOTAL.
		Price per Ton.	Total.	Price per Ton.	Total.	
U. S. Cast Iron Pipe & Foundry Co., 1421 Chestnut St., Phila., Pa.....	28 weeks	\$69.00	\$23,322.00	\$69.00	\$759.00	\$24,081.00
R. D. Wood & Co., 400 Chestnut St., Phila., Pa.....	34 weeks	55.50	18,759.00	55.50	610.50	19,369.50
Standard Cast Iron Pipe & Foundry Co., Bristol, Pa.....	22 weeks	40.00	13,520.00	50.00	550.00	14,070.00





# APPENDIX Y.

CANVASS OF BIDS FOR CONSTRUCTION, SECTION B, DORCHESTER TUNNEL. MARCH 25, 1913.

BIDDER.	47,000 Cu. Yds. Excava- tion.	1,400 Cu. Yds. Ma- sonry Re- moved.	2,000 Sq. Yds. Con- crete Base Removed.	12,000 Cu. Yds. Con- crete Ma- sonry.	1,000 Cu. Yds. Cinder Concrete.	200 Cu. Yds. Mortar Under Flanges of Beams.	100 Cu. Yds. Brick Masonry.	500 Lin. Ft. 6" to 12" Vit. Pipe.	700 Lin. Ft. 4" Vitrified Pipe.	500 Tons Setting Reinforcing Rods.	700 Tons Setting Steel and Iron.	5,000 Sq. Yds. Portland Cement. Mortar.	20,000 Sq. Yds. Pre- pared Textile and Asphalt.	10,000 Sq. Yds. Tarred Felt and Pitch.	Other Work and Risks not Covered by Other Items.	356 Lin. Ft. 3½' by 2' Cast Iron Pipe.	513 Lin. Ft. 4½' by 3' Cast Iron Pipe.	77 Lin. Ft. 30" Cast Iron Pipe.	TOTALS.
	a	b	3b	c	cc	3c	d	e	ee	f	ff	g	h	i	k	p	pp	3p	
Rowe Contracting Co., Brighton, Mass. ....	\$4.75 223,250.00	\$10.00 14,000.00	\$1.00 2,000.00	\$12.50 150,000.00	\$9.00 9,000.00	\$9.00 1,800.00	\$16.00 1,600.00	\$0.50 250.00	\$0.40 280.00	\$12.00 6,000.00	\$20.00 14,000.00	\$0.50 2,500.00	\$0.50 10,000.00	\$0.30 3,000.00	..... \$35,000.00	\$3.50 1,246.00	\$4.50 2,308.50	\$2.00 154.00	\$476,388.50
Jas. J. Coughlan Co., 43 Tremont St., Boston. ....	4.20 197,400.00	8.00 11,200.00	0.50 1,000.00	11.15 133,800.00	6.00 6,000.00	13.00 2,600.00	18.00 1,800.00	1.00 500.00	0.50 350.00	10.00 5,000.00	13.50 9,450.00	0.40 2,000.00	0.50 10,000.00	0.25 2,500.00	..... 19,000.00	5.00 1,780.00	6.00 3,078.00	4.00 308.00	407,766.00
P. McGovern & Co., 6 Beacon St., Boston. ....	4.25 199,750.00	5.00 7,000.00	0.50 1,000.00	10.50 126,000.00	9.00 9,000.00	15.00 3,000.00	20.00 2,000.00	0.75 375.00	0.25 175.00	12.00 6,000.00	16.00 11,200.00	0.40 2,000.00	0.60 12,000.00	0.30 3,000.00	..... 11,000.00	4.00 1,424.00	5.00 2,565.00	3.00 231.00	397,720.00
The Connors Bros. Co., 157 Plain St., Lowell. ....	3.85 180,950.00	15.00 21,000.00	1.00 2,000.00	10.50 126,000.00	6.00 6,000.00	14.00 2,800.00	15.00 1,500.00	1.00 500.00	0.75 525.00	10.00 5,000.00	12.00 8,400.00	0.60 3,000.00	0.45 9,000.00	0.35 3,500.00	..... 12,500.00	5.00 1,780.00	10.00 5,130.00	2.00 154.00	389,739.00
Coleman Bros., 1 Marginal St., Chelsea. ....	4.00 188,000.00	6.00 8,400.00	0.85 1,700.00	10.00 120,000.00	5.00 5,000.00	16.00 3,200.00	16.00 1,600.00	0.50 250.00	0.25 175.00	8.00 4,000.00	10.00 7,000.00	0.40 2,000.00	0.40 8,000.00	0.25 2,500.00	..... 11,000.00	4.50 1,602.00	5.50 2,821.50	3.00 231.00	367,479.50
Hugh Nawn Contracting Co., 82 Savin St., Roxbury. ....	3.50 164,500.00	6.00 8,400.00	0.60 1,200.00	10.50 126,000.00	5.50 5,500.00	14.00 2,800.00	20.00 2,000.00	0.75 375.00	0.50 350.00	7.00 3,500.00	12.00 8,400.00	0.40 2,000.00	0.50 10,000.00	0.30 3,000.00	..... 12,000.00	1.00 356.00	1.00 513.00	2.00 154.00	351,048.00



# APPENDIX Z.

CANVASS OF BIDS FOR FURNISHING AND DELIVERING F. O. B. CARS BOSTON 10,000 TO 30,000 OR 20,000 TO 50,000, BARRELS OF PORTLAND CEMENT. APRIL 2, 1913.  
Last date under which orders can be given under the contract to be April 30, 1914.

BIDDER.	Brands.	Price per barrel.		Maximum rate of delivery. Bbls. per week.	Notice required before shipment. Days.	Sum allowed for each bag returned to storehouse.	Sum allowed for each bag returned freight prepaid to mill.	Date in 1913 when bid terminates.	Remarks.	Tests made by the Boston Transit Commission showing time of setting in minutes.	
		Net with bags returned to mill.	Net with bags returned to warehouse.							Initial.	Final.
J. P. O'Connell Co., Dorchester, Mass. ....	Lehigh.	\$1.32	\$1.36	(Not stated).	10 days.	\$0.09	\$0.10	May 1		225	428
Waldo Brothers, 45-49 Batterymarch St., Boston. ....	Atlas.	1.32	(No bid).	To meet requirements of Commission.	6 to 10 days.	(No bid).	.10	April 10	The bid is on 80,000 bbls. subject to 15% variation. Shipments before May 1, 1914. Will contract for definite quantity less than 80,000 bbls. subject to a variation of 15% at the same price. Cement from storehouse 10c. per bbl. higher than price in bid. Teams not furnished.	209	409
*Wm. C. Norcross Co., 486 Albany St., Boston. ....	Lehigh or Alpha.	1.29	1.33	1,000	2 days.	.09	.10	May 1	All shipments to be made before May 1, 1914.	225 216	428 358
†United Bldg. Material Co., 603-610 Penn. Bldg., Philadelphia, Pa. ....	Giant.	1.27 for 10,000 to 30,000, & \$1.32 for 20,000 to 50,000.	(No bid).	2,000	(Not stated).	(No bid).	.10	April 10		208	346
Lehigh Portland Cem. Co., Beacon Building, Boston. ....	Lehigh.	1.27	(No bid).	(Not stated).	2 days.	(No bid).	.10	May 1	A specific amount within the limits called for in the bid to be named, and we will allow a variation of 15% either way. Payments within 10 days from date of shipment subject to discount of 1c. per bbl.	225	428
*The Edison Portland Cement Co., 79 Milk St., Boston. ....	Edison.	1.27	(No bid).	1,000	4 days.	(No bid).	.10	May 2	Cash 30 days or 1c. per bbl. discount for cash in 10 days from date of shipment.	280	510
*Fiske & Co., Inc., 25 Arch St., Boston. ....	Penn-Allen.	1.27	(No bid).	900	10 days.	(No bid).	.10	April 20	Bid withdrawn April 4, 1913.	260	430
John W. Ramsay, 161 Devonshire St., Boston. ....	Nazareth.	1.27	(No bid).	4,000	1 to 3 days.	(No bid).	.10	April 23	In addition to stipulated tests, will guarantee without extra charge the Autoclave Boiling Test.	240	463
Henry Crafts Sons, 266 Albany St., Boston. ....	Dragon.	1.27	1.31	900	10 days.	.09	.10	April 6	On basis of freight rate \$1.85 per ton from mill.	235	365
Starrett, Fields Co., 809 Massachusetts Ave., Boston. ....	Alpha, Whitehall or Dragon.	1.27	1.31	5,000	7 days.	.09	.10	April 30	Alpha — Whitehall — Dragon —	216 275 235	358 470 365
*Berry & Ferguson, 159 Devonshire St., Boston. ....	Alsen.	1.27	1.31	1,000	10 days.	.065	.075	April 2		225	430
Boston Bldg. Mat'l Co., 370 Albany St., Boston. ....	Nazareth.	1.27	1.29	4,000	1 to 3 days.	.095	.10	April 23	In addition to stipulated tests, will guarantee without extra charge, the Autoclave Boiling Test.	240	463
*David W. Lewis Co., 24 Milk St., Boston. ....	Helderberg.	1.27	1.29	2,000	4 days.	.095	.10	May 1	Cash discount of 1c. per bbl. on bills if paid in 10 days.	280	410
Alpha Portland Cem. Co., 131 State St., Boston. ....	Alpha.	1.27	1.28	3,000	12 days.	.0975	.10	May 1		216	358
Allentown Portland Cement Co., 120 Tremont Street, Boston. ....	Allentown.	1.27	1.27	1,500	12 days.	.10	.10	April 15		290	605
Pennsylvania Cement Co., 29 Broadway, New York. ....	Pennsylvania.	1.27	1.27	1,000	7 days.	.10	.10	April 17		195	465

\* Did not bid for furnishing 20,000 to 50,000 bbls.  
† Order taken over by the Giant Portland Cement Co.  
42,500 to 57,500 barrels at \$1.27 awarded to Lehigh Portland Cement Co.  
20,000 to 50,000 barrels at \$1.27 awarded to Alpha Portland Cement Co.  
10,000 to 30,000 barrels at \$1.27 awarded to Giant Portland Cement Co.





## APPENDIX AA.

CANVASS OF BIDS FOR FURNISHING 6,000 SOFT STEEL WEDGES. MAY 12, 1913.

BIDDER.	2,000 wedges 3" x $\frac{1}{2}$ " x $\frac{1}{16}$ " x 16" Weight of wedges, 4.25 lbs. each.		2,000 wedges 3" x $\frac{1}{2}$ " x $\frac{1}{16}$ " x 12" Weight of wedges, 3.25 lbs. each.		2,000 wedges 3" x $\frac{1}{2}$ " x $\frac{1}{16}$ " x 8" Weight of wedges, 2.25 lbs. each.		TOTAL.
	Price per lb.	Amount.	Price per lb.	Amount.	Price per lb.	Amount.	
Arthur C. Harvey Co., 374 Congress St., Boston, Mass.....	\$0.0575	\$488.75	\$0.0575	\$373.75	\$0.0575	\$258.75	\$1,121.25
New England Bolt & Steel Co., Everett, Mass.....	0.051	433.50	0.051	331.50	0.055	247.50	1,012.50

## APPENDIX BB.

CANVASS OF BIDS FOR FURNISHING 30 TONS OF  $\frac{3}{8}$ " ROUND OPEN HEARTH  
PLAIN STEEL RODS 18 FT. OR 24 FT. LONG. MAY 12, 1913.

BIDDER.	Price per ton of 2,000 lbs. f.o.b. cars Boston.	TOTAL.	TIME OF DELIVERY.
Jones & Laughlin Steel Co.	\$36.60	\$1,098.00	Could roll in six months.
Lackawanna Steel Co.....	36.60	1,098.00	Could make delivery in October.
Cambria Steel Co.....	36.60	1,098.00	Could furnish in 60 to 90 days. In a medium Bessemer steel to the A. A. S. M. "Specifica- tion For Plain & Twisted Bars for Concrete Re- inforcement," could ship in about three weeks after receipt of order.

## APPENDIX CC.

CANVASS OF BIDS FOR FURNISHING 30 TONS OF  $\frac{5}{16}$ " SQUARE OPEN HEARTH  
PLAIN STEEL RODS 18 FT. OR 24 FT. LONG. MAY 12, 1913.

BIDDER.	Price per ton of 2,000 lbs. f.o.b. cars Boston.	TOTAL.	TIME OF DELIVERY.
Jones & Laughlin Steel Co.	\$38.60	\$1,158.00	Could roll in five months.
Lackawanna Steel Co. . . . .	38.60	1,158.00	Could make delivery in October.
Cambria Steel Co. . . . .	38.60	1,158.00	Could furnish in 60 to 90 days. In a medium Bessemer steel to the A. A. S. M. "Specifica- tion for Plain & Twisted Bars for Concrete Rein- forcement," could ship in about three weeks after receipt of order.

## APPENDIX DD.

CANVASS OF BIDS FOR PAVING BOYLSTON STREET WITH ASPHALT OR BITULITHIC. JUNE 3, 1913.

BIDDER.	A.	B.	C.		Total with ASPHALT.	Total with BITULITHIC.
	6000 sq. yds. Asphalt.	6000 sq. yds. Bitulithic.	6000 sq. yds. Concrete Base.			
James Doherty, 133 Calumet St., Roxbury.....	\$1.62 9,720.00	\$1.60 9,600.00	\$0.88 5,280.00		15,000.00	14,880.00
Michael Meehan, 24 Oakdale St., Jamaica Plain.....	1.80 10,800.00	1.95 11,700.00	.90 5,400.00		16,200.00	17,100.00
Boston Paving Co., 1016 Adams St., Dorchester.....	1.63 9,780.00	1.67 10,020.00	1.00 6,000.00		15,780.00	16,020.00
Warren Bros. Co., 59 Temple Place, Boston.....	1.55 9,300.00	1.52 9,120.00	.83 4,980.00		14,280.00	14,100.00







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